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QUARTERLY WEATHER REPORT

OF THE

METEOROLOGICAL OFFICE

For 1879.

Published by the Authority of the Meteorological Council.

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1889.

PREFACE.

This volume is on the same plan precisely as that followed in the Quarterly Weather Report for 1878. It is accompanied by similar tables and plates, and by the usual Appendix giving the mean results derived from the numerical values yielded by the self-registering instruments at the Seven Observatories.

It contains two special Appendices.

The first is an analysis of the results of the observations made at Strathfield Turgiss in 1869 by the Rev. C. H. Griffiths to determine the best form of screen for the exposure of thermometers in order to ascertain the temperature of the air.

The second is a report on Hygrometrical Methods made by Mr. W. N. Shaw, M.A., for the Meteorological Council. This is the first part of the Report and relates to the Saturation Method, the Chemical Method, and Dew-point Instruments. It was submitted in the first instance to the Meteorological Council, and at their suggestion communicated to the Royal Society, and is now reprinted from the Philosophical Transactions.

ROBERT H. SCOTT,
Secretary.

Meteorological Office,
January 24, 1889.

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QUARTERLY WEATHER REPORT.

(NEW SERIES.)

1879.

INTRODUCTORY REMARKS.

The area to which the following Weather Report applies is mainly that contained between the 40th and 65th parallels of North Latitude, and the Meridians of 15° East and West of Greenwich, the British Isles lying nearly centrally within it.

The information on which the Report is based has been derived chiefly from the Daily Weather Reports issued by the Meteorological Office, the curves of the self-recording observatories, and the observations made over the United Kingdom at Stations of the Second Order. These have been supplemented by reference to the "Bulletin International" of Paris, and the North German and Russian Weather Reports.

The Report is divided into three sections as follows:—

Section I.—A General Summary of the chief features of the weather for the quarter, showing the most marked variations which have occurred, arranged with reference to the principal changes which have taken place in the distribution of atmospheric pressure during the period.

Section II.—Tables of the principal Cyclonic and Anticyclonic Systems, showing the size, movements, and other peculiarities of each, accompanied by smaller Tables showing the velocities of wind which were recorded instrumentally during the more serious gales.

Section III.—Remarks on the distribution of Wind, Pressure, Temperature, Vapour, and Rainfall for each month; accompanied by Tables showing the mean values for the different meteorological elements for the observatories, the Stations of the Second Order, and the Telegraphic Reporting Stations, and by two monthly plates. One of these plates shows graphically the relative prevalence of wind from each of eight points, and the other (1) the distribution of mean Pressure, (2) the movements of the depressions referred to in Section 2, (3) the distribution of mean Temperature, and (4) the amount of Rainfall measured at each station.

The Report is further illustrated by two sets of plates; (1) Chart Plates, showing by small maps the distribution of wind and pressure over the British Islands and their neighbourhood at 8 a.m. and 6 p.m. daily; and (2) the usual Plates giving on a reduced scale the curves of the self-recording instruments at the seven Observatories, in the same way as in the previous volumes of this Report.

Section I. needs no explanation.

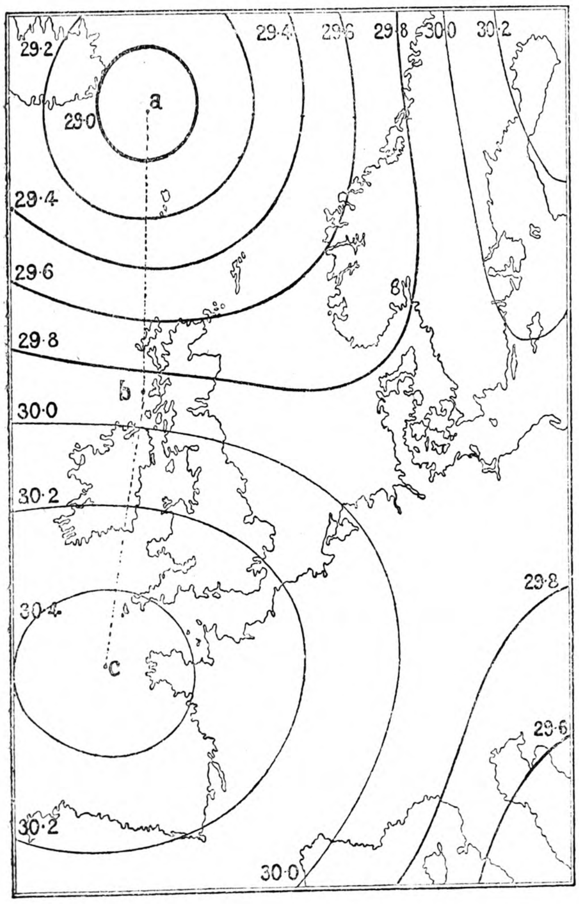
Section II.—Some of the terms employed may usefully be explained:—

The area enclosed by the outermost of a system of isobars of which the value *decreases* from without inwards is termed an "area of low pressure," or "cyclonic area," or "depression." Similarly, the area enclosed by the outermost of a system of isobars in which the pressure *increases* from without inwards, is termed an "area of high pressure," or "anticyclonic area," or "anticyclone."

In the accompanying figure (which is purely hypothetical) an area of low pressure is shown near Iceland, and an area of high pressure near the mouth of the English Channel, while the existence is indicated of another area of high pressure over the extreme north of Europe, and of a second area of low pressure over the Adriatic and the western part of European Turkey.

The area of somewhat high pressure which unites the high-pressure system over the Bay of Biscay with that over northern Europe, is termed a "ridge" or "col," while the arm of relatively low pressure which extends south-eastwards from the cyclonic system towards the col is termed a "hollow."

The centre of a cyclonic or anticyclonic system is the point at which the pressure is least or greatest, respectively. The centres of the systems shown in the diagram are marked "a" and "c." The position of the centre is not in general known from direct observation, but may be inferred with a sufficient approach to the truth from the form of the interior isobars.



The "depth" of a cyclonic system, and the "height" of an anticyclonic system, is the difference between the height of the barometer at the centre, and at the bounding isobar, which for the systems marked "a" and "c" in the diagram would pass through the point "b." The "motion" of the system is that of its centre.

The "size" of either system is the extent of the area enclosed by its outermost isobar.

The "form" of the system is the generalized form of its isobars, but as the isobars are only roughly similar to one another this definition does not admit of much precision.

The "gradient" between two places is measured by the proportion which the difference between the simultaneous heights of the barometer at those places bears to the distance between them. The barometric differences are expressed in decimals of an inch, and the unit of distance is 15 nautical miles. The gradient is thus virtually expressed in terms directly comparable with the French measure, in which the units are millimetres for barometric height, and a degree of the meridian (or 60 nautical miles) for distance. The gradients are always to be measured at right angles to the isobars.

In describing the size, depth, or rate of motion of Cyclonic systems, the following scales of nomenclature have been employed :—

Size	Very small	When the radius of the outer isobar is less than 50 miles.
	Small	„ „ „ is more than 50, less than 150 miles.
	Moderate	„ „ „ „ 150 „ 300 „
	Large	„ „ „ „ 300 „ 500 „
	Very large	„ „ „ „ 500 miles.
Depth	Very shallow	When the difference of pressure between the margin and centre does not exceed 0·2 in.
	Shallow	„ „ „ „ „ varies from 0·2 to 0·5 „
	Moderate	„ „ „ „ „ „ 0·5 „ 0·9 „
	Deep	„ „ „ „ „ „ 0·9 „ 1·4 „
	Very deep	„ „ „ „ „ exceeds 1·4 ins.
Rate of Motion	Very slow	When the average rate during the period referred to is less than 10 miles per hour.
	Slow	„ „ ranges from 10 to 20 miles per hour.
	Moderate	„ „ „ 20 „ 35 „
	Rapid	„ „ „ 35 „ 50 „
	Very rapid	„ „ exceeds 50 miles per hour.

For Anticyclonic systems, the scale of nomenclature for rate of motion has been retained, but for size and height the following rules have been observed :—

For size, anticyclones have been divided into only two classes: (1) Large—or those which cover extensive tracks of the earth's surface, which (as a rule) travel very slowly, and of which only a small portion is usually observable over our area; (2) Small—or those which either (*a*) are subsidiary to larger anticyclones, or (*b*) appear as a temporary phenomenon, between two cyclonic disturbances, often travelling at a considerable rate.

For the Height of Anticyclonic systems the following scale is employed :—

VERY SMALL	when the difference between the pressure at the outer isobar and that at the centre is 0·2 in., or less.
SMALL	„ „ „ „ is more than 0·2 in. but does not exceed 0·4 in.
MODERATE	„ „ „ „ „ 0·4 „ „ 0·7 „
GREAT	„ „ „ „ „ 0·7 „ „ 1·0 „
VERY GREAT	„ „ „ „ exceeds 1·0 „

The approximate values for the highest pressures about the centre of each anticyclone are quoted in figures whenever they are known.

The "form" of an anticyclonic system cannot always be ascertained, as it frequently happens that the greater part of it lies over localities for which the observations are either altogether wanting, or are very few in number.

In *Section* III. the tables contain the mean values of the chief meteorological elements for each month: (A) for the Self-recording Observatories, (B) for Stations of the Second Order, and (C) for the Telegraphic Reporting Stations.

Those for the Observatories are arranged in the same order as that in which they appear on the plates, and the data given are mainly identical with those printed in Table I. Appendix I. p. [1], where the monthly values for each observatory are summarised for the whole year. In the latter table, however, the barometrical readings are not reduced to sea level. The Stations of the Second Order and Telegraphic Reporting Stations have been arranged in eleven groups, corresponding with the eleven meteorological districts into which the United Kingdom has been divided for Agricultural and Sanitary purposes, and are printed in order of latitude, beginning with the station which lies furthest north.

The data in Table B. for the Stations of the Second Order have also appeared in the "Meteorological Observations from Stations of the Second Order for 1879," where they are arranged in the form of Monthly Summaries.

The Plates are as follows:

(I.) A Wind Chart showing by "area wind-roses" the prevalence of the wind from each of eight points; the frequency of winds blowing from between any specified points being indicated by the *area* of the portion of the wind-rose comprised between the corresponding limits. In the roses here employed the total area of those portions of the rose which indicate the winds and calms respectively (viz., the "petals," and the small shaded central circle), is equal to one-half the area of the circle round, or within, which they are drawn.

(II.) A Monthly Weather Chart, exhibiting:—

(1.) The Distribution of Mean Pressure, shown by isobars, drawn for each half-tenth of an inch, the mean barometric readings employed being those for 8 a.m. recorded at our Telegraphic Reporting Stations; but the mean pressure for the month at each Observatory, derived from 24 hourly readings each day, is inserted on the map close to the geographical position of the Observatory.

(2.) The movements of the depressions are shown in the following manner. The position of the centre of each of the chief depressions is determined as nearly as possible for 8 a.m. and 6 p.m. on each day during which the depression was within the area of our information; and these points are united by straight lines. The lines have arrow-heads drawn on them, showing the directions of the movements.

(3.) The distribution of mean temperature, shown by isotherms, drawn for each degree Fahrenheit; the mean temperatures employed being the numerical means of the maxima and minima for each day recorded at the Stations of the Second Order and the Telegraphic Reporting Stations. A correction at the rate of 1° F. for each 300 feet of vertical height has been added to the mean values in order to reduce them to the sea level. The mean temperature for each of the observatories, derived from 24 hourly readings each day, is also inserted.

(4.) The Rainfall chart shows in figures the Total Amount of Rain recorded during the month at each station. The values are inserted close to a dot, indicating the geographical position of the station to which it refers.

When both an Observatory and a Telegraphic Reporting Station are situated at the same place, the value for the Observatory has been used in preference to that for the Telegraphic Reporting Station, but both values are given in the tables.

In preparing the Chart Plates the isobars have been drawn, as a rule, for each alternate tenth of an inch; but when the difference between the extreme readings reported and the extreme isobar at any given time exceeds a tenth of an inch, the value of such readings is stated in figures, which are placed in their proper position on the map.

A broken isobar indicates uncertainty as to its course, owing to deficiency of information.

The prevalent winds are shown by arrows, which are drawn flying with the wind. The force is indicated by the number of barbs and feathers thus: ⋙—→ = a strong gale (forces 8 to 12); —→ = a strong wind (forces 5 to 7); —⇀ = a light to moderate wind (forces 1 to 4); and ⊙ = a dead calm.

PART I.

SECTION I.

GENERAL SUMMARY FOR THE QUARTER.

THE weather during the quarter was cold, gloomy, and cheerless, wet in the south-west and south, but on the whole dry in the north-east and north. Snow, sleet, and soft hail from the eastward have been frequent, and have alternated with falls of warmer rain with winds blowing from the south-westward and westward. The depressions observed have been somewhat numerous, and may be grouped into three main divisions; viz. (1) those which showed themselves to the westward or north-westward of Scotland, and travelling eastwards or north-eastwards, passed over Scandinavia, giving us strong South-westerly to Westerly winds and gales which were chiefly felt over the northern districts; (2) those which, appearing off the west of Ireland, moved North-north-eastwards, causing as a rule strong Southerly to South-westerly winds or gales over our western districts; and (3) those which appeared first to the westward or south-westward of Valencia, but instead of moving north-eastwards, travelled in a south-easterly (easterly to southerly) direction towards France, sometimes dispersing when they arrived over the land, but on other occasions continuing their journey right across the continent to the Mediterranean. These gave us strong South-easterly and Easterly winds and gales, which were felt chiefly on our eastern and southern coasts, bringing snow and sleet to most parts of England, and very heavy cold rain to our south-west coasts. Depressions of this latter class were unusually numerous during this quarter, and this fact accounts for the excess of Easterly winds, and the inclement weather which has prevailed. In addition to the above there were a few disturbances which have moved somewhat irregularly, the most conspicuous of which are the cyclonic systems Nos. II., XV. and XVA., and XXIII. and XXIV. Of these, system No. XXIII. was remarkable for the unusual rapidity of its movements, for whereas at 8 a.m. on March 12th its centre was over Scotland, by 6 p.m. it had reached North Germany, giving an east-south-easterly motion of more than 70 miles an hour.

January 1st–4th.—Pressure was on the whole highest over southern, lowest over northern Europe, and many depressions (chiefly small) passed over the British Islands, producing exceedingly variable and strong winds, much rain, snow, and some North-westerly gales in the north. Temperature, however, was not very low, and on the 1st was decidedly high, for the time of year, at the southern stations.

January 5th–11th.—The weather became anticyclonic, first at our central stations and afterwards in the north and east, where the barometer rose to between 30·3 inches and 30·5 inches on the 7th. Depressions then appeared off our south-west coasts, and moved south-eastwards to France, producing biting Easterly winds and gales with heavy cold rains and snow, and hard night-frosts, especially over our inland districts.

January 12th–15th.—A temporary change occurred; pressure increased over the Peninsula and France, and for a few days Southerly to Westerly breezes were experienced over the United Kingdom, with mild weather and a good deal of warm rain, while some depressions moved north-north-eastwards up our western coasts. At some of our western and south-western stations maximum temperatures were recorded as high as 52°.

January 16th–February 5th.—Pressure again became high over and to the north-eastward of the North Sea, lowest over France, and for a time to the north-westward of our Islands also. Severely cold weather set in with biting Easterly winds in most places, and unusually gloomy weather. Several depressions passed by our south-western coasts to France during this interval, but, except at the south-western stations, the rainfall was comparatively slight, especially on our east and north-east coasts.

February 6th–10th.—The Easterly winds now gave way again, and winds from the Southward and Westward took their place all over the kingdom. These brought with them mild soft weather from the Atlantic, and occasionally blew with considerable violence, as some depressions (Nos. XIII. and XIV.) passed by our northern coasts. Large quantities of rain fell in the west and south-west, and temperature rose so that the highest points reached ranged from 50° to 58°. On the 11th the depressions Nos. XV. and XVA. passed away to the eastward and southward of our Islands, and in their rear the barometer rose and the wind drew into North.

February 12th–23rd.—This was a very unsettled period. For the greater part of the time an arm or band of low pressure lay across our Islands, in a north-west to south-east direction separating an area of high pressure over northern Europe from another which lay over the Atlantic to the south-westward of the United Kingdom. The intermingling of the South-easterly and Easterly winds, which the band of low pressure thus caused at our northern and eastern stations, with the Westerly and North-westerly winds which prevailed in the west and south, was productive of a constant succession of snow, sleet, and cold rain showers, accompanied by low temperature of the air. Scotland, however, had less rain than the other parts of the kingdom. On the 21st this band of low pressure began to break up slowly, several shallow depressions of minor importance were formed in our neighbourhood, and strong Northerly winds appeared in the West.

February 24th–26th.—Very cold Northerly to North-easterly winds prevailed over the country during this time, blowing rather strongly on our south and east coasts with showers of snow, but lightly in the north, where in fact South-westerly airs began to appear on the 26th. The cold was very sharp in Scotland on the night of the 25th, just as the band of high pressure which separated the Easterly winds in England from the south-westerly in the far north, passed over.

February 27th–March 1st.—The Easterly winds now gave way, but the Westerly breeze did not at once become general, so that low temperature continued to be the prevalent feature of the weather over England till the month ended, but rain began to take the place of snow, and the air lost much of its rawness and inclemency.

March 2nd–12th.—This was a period marked by uniformly high pressures over France and the south of England, accompanied in our southern districts by moderate or light South-westerly to Westerly breezes and generally fair weather, with mild days, but often sharp nights. Over the northern parts of the country, however, there were rather steep gradients for South-westerly and Westerly winds. These winds were strong, and increased to a gale at times, as the centres of several depressions passed by the north of Scotland, and brought rain to our western and northern coasts. The 6th, 7th, and 8th were peculiarly mild and genial over England, where the thermometer rose to between 60° and 65° at the inland stations. This state of things, however, terminated with the 11th, and on the 12th a depression (No. XXIII.) passed rapidly over the country, bringing with it cold rain, snow, and hail, after which the barometer rose in the west, and the wind veered Northwards.

March 13th–14th.—An anticyclone lay over the British Isles during these two days, so that in most places light breezes or calms, prevailed with dry weather and cold nights, the thermometer falling to 19° at Leith. The appearance, however, on the 14th, of a very small and shallow depression over our north-west and west coasts close to the centre of the anticyclone, put an end to the fine weather in the north-west, and a little snow fell in many places.

March 15th–18th.—A very unsettled condition prevailed, a band or trough of low pressure being formed over our Islands, causing strong, cold Easterly winds and snow over all the more northern districts, while more moderate Westerly breezes and fairer weather were felt in the south. These systems soon broke up and a period set in on the 17th, in which the prevalent wind was light from the southward; pressure was very uniform, fog was prevalent, and slight showers of sleet fell during the daytime. Some remarkable solar halos were seen in the south on the 18th, and a parhelion at Jersey in the afternoon.

March 19th–27th.—Although the weather on the 19th was very mild over the south-east of England (the maximum temperature being as high as 64° in London and 68° at Cambridge), a change to a new period of cold had set in at our western stations, and for nine days the wind remained Easterly, blowing strongly at times in the southern and eastern districts, and accompanied as a rule by dry, cold weather. On the 25th, however, some snow fell, and on the 26th the amount increased as depression No. XXV. passed in from the Atlantic towards France. After the 27th the barometer began to rise over Spain and Portugal, and the Easterly wind died out.

March 28th–31st.—Southerly and South-westerly winds were again established over north-western Europe, and soon began to blow hard over the United Kingdom. Temperature rose rapidly, rain fell almost everywhere, and two well-marked depressions (Nos. XXVI. and XXVII.) passed along in a north-north-easterly direction outside our extreme north-western coasts. As the month closed the South-westerly winds moderated in strength, and veered a little in the west, and the air became drier.

SECTION II.

TABLE OF CYCLONIC SYSTEMS.—JANUARY, 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. I. January 1-2.	No. II. January 2-4.	No. III. January 3-4.
Form	Somewhat oval	Irregular; somewhat oval	Nearly circular
Size	Rather large	Rather large	Moderate
Depth	Variable; moderate to deep, and to moderate again.	Moderate to rather deep	Shallow
Where first Observed	Off south-west coast of Ireland	Off south-west of Ireland	Off the west of Ireland
Direction of Motion	Easterly	East-south-east, then east-north-east and north-east.	South-east
Rate of Motion	Rather rapid	Rather rapid at first, then slow	Slow
Regions passed over by Steepest Gradients.	English Channel and France	English Channel and northern half of France.	Mouths of St. George's and English Channels.
Termination	Dispersed	Dispersed near the Danish coast	Dispersed over north of France
Time under Observation	About 24 hours	About 40 hours	About 24 hours
Accompanying Winds	South-westerly winds, strong to a gale in the southern districts; North-easterly, strong over midland and northern counties. Wind afterwards becoming Northerly everywhere.	Strong Southerly to Westerly and North-westerly winds; in the southern districts, Northerly and North-easterly, light to moderate, in north.	South-westerly to Westerly on its southern side; North-easterly on its northern and north-western side.
„ **Weather**	Very rough and unsettled, with rapid fall of temperature in rear. (See Falmouth and Kew curves for 1st.)	Cold in north and north-east; very changeable in south, with rapid oscillations in temperature. (Plate I.)	Mild in front of the depression, cold in its rear.
„ **Rainfall**	Very heavy fall of rain and snow all over our southern and south-western districts, and in France.	Heavy rain over our south-western and southern districts, and northern half of France. Snow in north; lunar halos in northern districts.	Considerable in the front of the disturbance; slight snow in its rear.
REMARKS	This depression was apparently secondary to a larger disturbance, whose centre had reached the west of Norway, and which will be found described in the Quarterly Weather Report for 1878. Its effects on pressure are very clearly marked in the Valencia, Falmouth, and Kew barograms, Plate I. Pressure at the time of its appearance was highest (about 30·25 ins.) over the south of France; lowest (about 28·5 ins.) off the west of Norway.	This depression (like No. I.) was apparently secondary to larger disturbances lying over Scandinavia. The alternations in pressure are very distinctly marked in the Valencia, Falmouth, and Kew barograms, and somewhat clearly in that for Stonyhurst. (Plate I.) Pressure continued highest over France, lowest over Scandinavia.	This depression also seems to have been subsidiary to that in the far north, and to have been affected somewhat in its movements by No. II., in the rear of which it appeared. It was followed immediately by the formation of an arm of high pressure, stretching northwards from Spain over Ireland. Pressure was at first highest over Southern France, and then over the Peninsula and Bay of Biscay. No. IIIA.—On January 5th a somewhat similar depression seems to have travelled south-eastwards from a position off the west of Ireland to the west of France, and there to have dispersed.

SECTION II.

Table of Cyclonic Systems—January 1879.

No. IV. **January 7.**	No. V. **January 8-9.**	No. VI. **January 9-11.**	No. VII. **January 12-13.**
Apparently varying	Oval; major axis lying from west-north-west to east-south-east.	Apparently nearly oval	Apparently nearly circular, but not clearly marked.
Rather large	Rather large	Moderate	Moderate.
Moderate	Moderate	Moderate	Moderate.
Off the south-west of Ireland	Off the south of Ireland	Off the west of Ireland	To the south-westward of Valencia.
About north	East-south-easterly	South-easterly and varying	About north-north-east.
Slow	Rapid	Slow	Moderate.
Ireland, Wales, and Scotland	Ireland, England, and the north of France.	Ireland, Wales, and south-west of England.	Ireland and Scotland.
Passed away to northward	Passed south-eastwards over the Mediterranean, then east-north-eastwards, and dispersed over north-western Turkey.	Dispersed over Brittany on night of 11th.	Passed away to northward.
About 24 hours	About 36 hours	About 60 hours	About 30 hours.
South-easterly to Southerly gales on nearly all our coasts, followed by temporary shift to West and North-west on our south-west coasts as the depression moved north.	South-easterly to Easterly gales over our Islands, lulling early on 9th.	Severe South-easterly gales over our western districts; fresh to strong East to South-east winds elsewhere. Wind lulling on 11th, as it backed round in the rear of the depression.	Southerly winds, strong to a gale, on all our western and northern coasts; light Southerly to South-westerly breezes over our midland and eastern counties.
Rainy weather in west, dull elsewhere; temperature rising as the wind veered towards south.	Dull, squally weather on our eastern coasts; snow and rain at our western stations. Very heavy and continuous rain in the west of France.	Snow showers in most places, snow and rain in the south-west, and in the west of France.	Changing from fine to showery as the depression advanced, with rapid rise of temperature.
Rain heavy in south-west; rather so in west generally.	Very heavy indeed in west of France, and at mouth of English Channel.	Fall not heavy anywhere; amount not measureable over western parts of Great Britain and north of Ireland.	Fall heaviest (0·4 in. to 0·6 in.) in the west; very slight over England generally.
This depression appeared in the rear of the high-pressure area which was formed as depressions Nos. II., III., and IIIA. disappeared. Its centre did not advance over our Islands, so that its exact track cannot be stated. In its rear a second high-pressure area appeared temporarily to the westward and southward of Corunna. There was no definite recovery of pressure on our south-west coasts in its rear.	This depression followed so closely across the rear of No. IV. that at first it was doubtful whether the latter had not returned; the self-recording instruments at Valencia, however, show that such was not the case. See Plate II.	The motion of this depression was very slow when compared with that of No. V., the reason for which is not quite evident. On the 11th a subsidiary depression was formed near the mouth of the Elbe, which moved westwards at first, but finally travelled away to the north-eastward.	The central area of this depression was never actually over any part of the United Kingdom. The values for *Size, Depth* and *Motion* are therefore only approximate.
Pressure at time of appearance of this depression was highest over the south-west of Norway and the eastern parts of the North Sea.	Pressure at the time of its appearance was high (30·2 +) over Scandinavia, lowest off our south-west coasts. The second high-pressure area (over and to south-westward of Spain) disappeared as the depression advanced.	Pressure continued highest over Scandinavia till the depression dispersed, when the high-pressure area over south-western Europe again appeared. See Map for 12th January, 8 a.m.	Pressure at time of its appearance was high, both over northern Europe and the Peninsula, a valley of relatively low pressure lying between them, with a subsidiary disturbance off the northern Dutch coast.

TABLE OF CYCLONIC SYSTEMS.—JANUARY, 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. VIII. January 14-15.	No. IX. January 15-17.	No. X. January 17-18.
Form	Apparently varying from oval to circular.	Circular	Apparently oval
Size	Very large	Rather large	Rather large
Depth	Rather deep, but gradients not very steep.	Moderate	Moderate
Where first Observed	Off the west of Ireland	Off the south-west of Ireland	Off the west of Ireland
Direction of Motion	North-easterly	South-easterly	About north-north-east
Rate of Motion	Slow	Moderate	Moderate
Regions passed over by Steepest Gradients.	Western and north-western parts of the British Isles.	Our south-west coasts, the north-west of France, and mouths of St. George's and English Channels.	Ireland, St. George's Channel, the Irish Sea, and Scotland.
Termination	Apparently dispersed off our northern coasts.	Dispersed over the Mediterranean	Apparently dispersed off our extreme north-west coasts.
Time under Observation	48 hours	About 40 hours	About 30 hours
Accompanying Winds	Southerly and South-westerly at first, strong generally, and a gale in places; then veering to Westward as the centre drew near to the Hebrides, and a subsidiary "hollow" was formed in the east.	Easterly to North-easterly gales on our south-west coasts; strong Southerly and South-westerly winds in the west of France, subsequently backing to the eastward; Westerly gales in north of Spain.	South-easterly and Southerly gales on our western and northern coasts, finally veering to West in Ireland, and falling light. Fresh South-south-easterly winds on our eastern coasts.
„ **Weather**	Mild at first; foggy in all the eastern and southern districts; rainy in the the west; then showery generally. Temperature falling considerably as wind veered.	Cold generally, especially over England; rainy in the south-west, fine elsewhere.	Temperature rather low, but rising briskly; weather dull; foggy in south-east; rainy in west. Weather clearing in its rear.
„ **Rainfall**	Very general, and heavy at some southern stations.	Not heavy, but very general over the south-west of our Islands and west of France.	Heavy (0·7 to 1·0 inch) at some western stations, slighter elsewhere.
REMARKS	As this depression advanced to our north-west coasts subsidiary disturbances were formed gradually on its south-eastern side (*i.e.* off our eastern coasts), one of which became very well defined after the main depression broke up and moved south-eastward to the mouth of the Elbe, off which it lay at 8 a.m. on the 16th.	This depression gradually filled up as it moved south-eastwards, so that while its lowest readings must have been about 29·3 ins. on its first appearance, there were apparently none lower than 29·9 ins. on the morning of the 17th, when the centre had reached the south of France. Its winds consequently decreased in force, and the circulation gradually broke up. Winds on our north and east coasts were not drawn into the swirl.	This depression apparently grew less and less deep as it moved northwards, and finally dispersed somewhere to the westward of Scotland. As it dispersed a subsidiary disturbance (small) was formed over the north of France on the evening of the 18th, but dispersed again before next morning.
	Pressure at the time of the appearance of this depression was highest (30·5+) over Russia, whence an arm of rather high readings (30·3+) extended south-westwards across North Germany to the south of France. On the 15th the Russian high-pressure area was moving southwards. and a new one began to appear over Spain.	Pressure at the time of its appearance was high (about 30·2 ins.), both in the south-west of France and over the Gulf of Bothnia. Depression No. VIII. was just dispersing off our northern coasts, and the barometer was rising at all our northern stations. A very shallow subsidiary disturbance was developed over Holland on the 17th, as the main depression broke up.	Pressure at the time of the appearance of the main depression was highest over Scandinavia, the area of high reading extending south-westwards in a long arm, which reached as far as to Biarritz. In all probability a second high-pressure area lay to the westward and south-westward of Portugal, but to decide this the necessary information is not at hand.

TABLE OF CYCLONIC SYSTEMS.—JANUARY-FEBRUARY, 1879.

No. XI. January 19-24.	No. XII. January 31—February 4.	No. XIII. February 4-7.	No. XIV. February 7-8.
Apparently somewhat elongated, but uncertain.	Nearly circular at first, then elongated and varying.	About circular at first, then varying somewhat.	About circular at first.
Large	Large	Very large	Very large.
Moderate	Rather deep at first, then shallow	Rather deep	Deep.
To the south-westward of Ireland	To the south-westward of Ireland	To north-westward of the British Isles.	To the north-westward of the British Islands.
First north-easterly (till 20th), then about south-easterly and southerly.	First north-easterly (till 1st) then south-easterly and easterly.	Easterly and north-easterly	North-easterly and northerly. (See Remarks below.)
Slow at first, then moderate	Slow	Slow	Uncertain.
Ireland, west of Great Britain, and north-west of France.	Ireland and west of Great Britain	Western and northern parts of our Islands.	British Isles and English Channel.
Dispersed gradually over Spain	Passed away south-eastwards towards Italy.	Partly filled up, and then became secondary to No. XIV.	Travelled away to north-eastward.
Nearly five days	Nearly five days	About 70 hours	About 36 hours.
South-easterly gales on all our western coasts, and moderate South-easterly to Southerly winds in the east. Wind backing to Eastward after 21st, and blowing strongly at times.	South-easterly gales in west and strong South-easterly breezes in east as the depression came on. Wind moderating and backing eastwards as depression moved south-eastwards. A South-westerly breeze was felt temporarily on our south-west coasts on 2nd. See Chart-Plate 2.	Southerly to Westerly winds; a gale at Stornoway; fresh to strong in the west and north, generally moderate in the east.	Strong South-westerly, followed by fresh Westerly.
Cold generally, especially after the 21st; dull at first, with rain and snow in west, then finer with snow showers in several places.	Cold, dull weather, with heavy rain in the south-west at first; snow in north. Rain, followed by snow, then spread over England also, and cold increased as wind backed eastwards.	Cloudy and showery; weather becoming mild after a long period of cold.	Dull and rainy; then less cloudy, but showery.
The rain was very heavy in the south-west of Ireland on the 19th.	The rain was much heavier in the south-west as the depression first came on, than it was elsewhere, or at subsequent dates.	Rain gradually spreading over us as the depression advanced. Fall heavy at some western stations only.	Rainfall very general over Ireland and England, but little or none in the north.
This depression apparently advanced from the south-westward until the 20th, when it began to move south-eastwards, as shown in the map for the month. The reason for this change of motion is not evident, as the distribution of pressure at the time of the appearance of the the depression was not very dissimilar to that of the 17th, when depression No. X. appeared.	This depression after reaching our south-west coasts and curving to south-eastward, grew very much shallower, and in fact almost filled up. Its form was, however, not altogether lost until some time on the 7th. A shallow subsidiary was developed over the Channel on morning of 2nd, but soon dispersed.	This depression brought with it a complete change from the cold weather which had prevailed over the United Kingdom for so long. It apparently grew deeper as it approached the Hebrides, but subsequently became shallower as No. XIV. appeared. Though rather deep, its gradients were nowhere steep, so that the winds were not violent.	This depression was accompanied by several subdiary disturbances and the position of its centre after 6 p.m. 7th cannot be very accurately ascertained.
Pressure at time of its appearance was highest (30·5+) over Scandinavia, whence an arm stretched south-westwards to the south-west of France. As the depression moved south-eastwards pressure increased to rather above 30·9 ins. at the northern extremity of the Gulf of Bothnia.	Pressure at time of its appearance was highest over Great Britain, North Sea, Denmark, and south of Scandinavia, but on the 2nd gave way in the far north, and another depression appeared over Lapland and Finland, which soon passed away eastwards and northwards.	At time of its appearance an anti-cyclone (30·0+) lay over England and the southern part of the North Sea. This moved southwards as the depression advanced, and developed into a broad high-pressure area which covered the whole of Spain, France, and Germany, and having in it two distinct maxima, one over North Germany, the other over the south-west of France.	Pressure at the time of its appearance was highest over the Mediterranean, lowest to the north-westward of our Islands, and subsequently became relatively high over northern Europe also.

TABLE OF CYCLONIC SYSTEMS.—FEBRUARY, 1879.

NATURE OF CHARACTERISTICS OBSERVED.	NOS. XV. AND XVA. February 9-12.	NO. XVI. February 13-14.	NO. XVII. February 15-18.
Form	Very irregular, there being two distinct minima.	Approaching to circular, but varying.	Uncertain; apparently nearly circular
Size	Moderate	Large at first, but rapidly diminishing.	Uncertain; apparently moderate
Depth	Moderate	Deep, but growing shallow	Uncertain
Where first observed	Off the south-west of Ireland	Off the west of Ireland	Off our north-west coasts
Direction of Motion	Easterly and south-easterly	South-easterly	No decided motion. (No track drawn on the Monthly Weather Chart, No. 2, for February.)
Rate of Motion	Slow	Slow	Nil
Regions passed over by steepest Gradients.	France and the Channel	British Isles and west of France	The North Sea (for South-east winds) and our western districts (for North-west winds).
Termination	Dispersed	Dispersed off west of France	Dispersed, after undergoing some modifications.
Time under Observation	About four days	About 48 hours	About four days
Accompanying Winds	Variable. Easterly in the north, fresh South-westerly and Westerly in the south; then Northerly, and falling light.	Southerly to South-easterly; fresh to to strong.	South-easterly to Easterly gales over the North Sea and Scotland; strong North-westerly winds on our western coasts.
„ Weather	Dull, foggy, and rainy till 11th, then finer, but colder; snow on eastern shores of North Sea.	Rather mild and rainy in west and south at first; then colder, dull, wet, and foggy.	Cold and very unsettled; rainy over England at first; sleet, and snow in the north, afterwards becoming general. Lightning in south-west.
„ Rainfall	The rainfall was considerable over our southern counties on the 10th-11th, but very little fell in the north.	The rainfall became very general on 13th, and was somewhat heavy in the east of Ireland.	Heavy on our north and north-eastern coasts on 15th and 16th.
REMARKS	This depression had two distinct minima the first of which moved eastward to Denmark, while the second travelled south-eastwards over the west of France. Pressure at the time of its appearance was relatively high both over northern and southern Europe. low over our Atlantic coasts. In its rear the barometer rose decidedly and an anticyclonic area appeared over the Bay of Biscay. (See anticyclone No. VII., p. 25.)	The filling up of this depression proceeded steadily from the time that its centre touched our extreme western coasts (evening of 13th), and by the night of the 14th all trace of it had disappeared. Pressure at the time of its appearance was (very temporarily) highest over France, but the anticyclone moved steadily to the northward, and at 8 a.m. 14th was off the west of Norway.	This depression, though apparently stationary, developed a subsidiary on the night of the 15th, and this advanced very slowly in an east-south-easterly and easterly direction over the south of England to Holland, where it lay on the 18th. Here it dispersed. Pressure at the time of the appearance of this system was high both over northern Europe and the Peninsula; and as it passed off the southern high-pressure area became the more important of the two. (See Chart-Plate 3.) Between the 20th and 22nd a series of changes occurred very similar to (but less important than) that described above.

TABLE OF CYCLONIC SYSTEMS.—FEBRUARY-MARCH, 1879.

No. XVIII. **February 25-26.**	No. XIX. **March 2-3.**	No. XX. **March 4-5.**	No. XXI. **March 5-6.**
Irregular; but at times nearly circular.	Uncertain; apparently somewhat elongated. Major axis lying west-south-west to east-north-east.	Apparently circular	Apparently nearly circular.
Large	Moderate	Large	Large.
Moderate	Moderate	Deep	Moderate.
Off the south coast of France	Off the west coast of Norway	To the north-westward of the Hebrides	To the westward of Scotland.
North-easterly	Easterly and north-easterly	North-easterly	East-north-east.
Rapid	Moderate	Rapid	Rapid.
France and southern parts of the British Isles.	Scotland, the Shetlands, and west of Norway.	North-western and northern parts of our Islands, and west of Norway.	North-western and northern parts of our Islands, and Scandinavia.
Dispersed over the Baltic	Travelled away, apparently to the northward.	Travelled away to the north-eastward and became shallow.	Travelled away eastwards over northern Russia.
Two days	About two days	24 hours	24 hours.
North-easterly winds and gales over France, North Germany, and the south of our Islands.	Strong South-westerly to Westerly on our western and northern coasts.	South-westerly to Westerly gales in the west and north; moderate to fresh breezes in the south and south-east.	South-westerly to Westerly gales in our Islands, strongest in west and north.
Cold and squally, with snow, sleet, and hail. Fogs in its rear.	Mild, cloudy, and rather showery in north-west and north, while fine cold weather prevailed in south.	Mild and very rainy in west and north, cold and *slightly* showery in south.	Mild and showery, becoming much milder as the wind veered.
The fall (chiefly snow and soft hail) was very general, but not very heavy in our Islands.	Rainfall (partly snow) very slight at first, even in far north. Showers in west later owing to subsidiary disturbances.	0·6 in. of rain in north of Ireland on 4th; 0·6 in. to 0·7 in. at Ardrossan and Nairn.	Not heavy; hardly any on our north-east coasts.
This depression travelled at a great distance from our Islands, but spread northwards over England and nearly the whole of the North Sea as it passed.	The centre of this depression passed our northern coasts at a considerable distance. It was the first of a series which remained with us for some days.	The form of this depression was very well defined, and the system was free from complications of any kind.	The position of this depression at 8 a.m. on 5th cannot be relied on with certainty, as it is probably the well-marked subsidiary which appeared in front of the main depression which is shown by the isobar "29·3" at that hour.
Pressure when the disturbance at first appeared was highest to the north-westward of our Islands; but as it passed off the barometer rose in the south-west and south and an anticyclone (No. VIII.) was formed over the Bay of Biscay and France.	Pressure at time of its appearance was highest over France and our southern districts, where an anticyclone (No. VIII.) had been formed after the cyclones No. XVIII., &c. had passed off.	Pressure when the depression arrived was highest in an anticyclone which lay over France and the Bay of Biscay, lowest to the northward of our Islands.	Pressure remained highest over France as the centre approached, and the anticyclone moved a little to the northward for a time in its rear. Subsidiary depressions appeared in its rear on the westward and passed south-eastwards over Scandinavia and the Baltic.

TABLE OF CYCLONIC SYSTEMS.—MARCH, 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. XXII. March 9-11.	No. XXIII. March 12.	No. XXIV. March 14-17.
Form	Somewhat circular, but irregular	Elongated, with two minima	Elongated; two minima
Size	Large	Moderate	Variable; but small on the whole
Depth	Moderate	Moderate	Shallow
Where first Observed	To the northward of Scotland	Over Scotland	Off west of Scotland
Direction of Motion	North-easterly till 10th, then south-easterly.	South-easterly	South-easterly and easterly; then stationary.
Rate of Motion	Moderate	Very rapid	Very slow and irregular. (No track drawn on Map 2 for March.)
Regions passed over by Steepest Gradients.	Northern half of our Islands, and southern parts of Scandinavia.	British Islands, North Sea, and Netherlands.	British Isles (for Easterly winds in north, and westerly in south).
Termination	Travelled away over Russia	Dispersed over central Europe	Dispersed gradually
Time under Observation	48 hours	About 15 hours	About 60 hours
Accompanying Winds	South-westerly to North-westerly; gales in the far north and north-east, more moderate elsewhere.	North-westerly gales and strong winds over our Islands and North Sea.	Easterly winds, strong to a gale, in our northern districts. South-westerly and more moderate in the south.
„ **Weather**	Mild and somewhat showery in west and north, dry, but cold in east and south. Colder generally where wind veered to north-west.	Cold and raw; snow in the north and east.	Cold and very unsettled; rain and snow in north; showery but milder in south.
„ **Rainfall**	Slight; but general on the 10th	Not very heavy anywhere	Heaviest over north and north-east districts; chiefly wet snow.
REMARKS	After this depression had begun to move south-eastwards, well-marked subsidiaries were developed in its rear (see No. XXIII.), and the weather became permanently colder, with North-westerly winds. Pressure at time of first appearance of this depression was highest (30·5 and more) over France, lowest to northward of our Islands, the gradients being moderate.	The fall of temperature as this depression passed was very large (see the curves on Plate XV.), and the clearance of the sky in its rear was very decided. At the time of its appearance pressure varied from about 30·4 inches over the Bay of Biscay to about 28·94 inches over northern Russia. An anticyclone was formed in its rear, and anticyclonic conditions prevailed with slight interruptions for some time. See, however, next system.	This depression formed a "trough" which separated an anticyclone over France from a second anticyclone over our northern districts and the south of Scandinavia. Its eastern portion broke up first (during the night of the 16th), the western portion dispersing gradually on the 17th. Pressure at the time of its appearance was uniformly high over our Islands and France, low over central Russia.

TABLE OF CYCLONIC SYSTEMS.—MARCH, 1879.

No. XXV. **March 26-28.**	**No. XXVI.** **March 28-29.**	**No. XXVII.** **March 30.**
Apparently circular	Apparently circular	Apparently nearly circular.
Moderate	Large	Very large.
Moderate, then growing shallow	Apparently moderate	Deep.
To south-westward of our Islands	To south-westward of Ireland	To the westward of Ireland.
South-easterly and easterly	North-north-easterly	Northerly or north-north-easterly.
Slow and irregular	Moderate	Moderate.
British Islands	Western parts of British Isles	Western and northern districts of the British Islands.
Dispersed gradually	Travelled away to north-north-eastwards	Travelled away to north-north-eastwards.
About 60 hours	About 36 hours	About 24 hours.
Strong South-easterly to Easterly winds and gales in our Islands.	South-easterly and Southerly gales in the west and north of our Islands, light Southerly to South-westerly winds in east and south, but South-easterly gales in Norway and Denmark.	Southerly to South-westerly, blowing a gale in the west and north, and a fresh breeze in south and south-east.
Cold and raw, with snow showers	Becoming mild and rainy	Mild; and in most places showery.
Not heavy anywhere, and decreasing as the centre advanced.	Fall general; but heavy in south-west only	Not heavy anywhere. No rain in far north.
This depression seems to have advanced rather quickly till near our coasts, when its motion grew slow and irregular and finally almost ceased; the depression meantime filling up slowly.	This depression reached our south-west coasts as No. XXV. was dispersing, but moved north-north-eastwards instead of east, and brought in mild Southerly and South-westerly winds from the Atlantic.	This depression followed closely on No. XXVI., and was very similar to it in its general features.
Pressure had been for some days highest over the northern districts, lowest over France, and Easterly gales or strong winds had frequently prevailed over Ireland and England. From the chart for 28th, however (see Chart-Plate 5), it appears that a second anticyclone had been formed to the westward of Spain, and was extending eastwards.	Pressure remained high over northern Europe, but increased over south-western Europe also as this disturbance passed along.	Pressure was highest over northern and south-western Europe when it first appeared, the two regions being united by a broad "coll" which stretched across France and North Germany.

TABLES OF GALES.

No. 1. (CYCLONIC SYSTEM, No. IV.)

Stations.	VELOCITY 30-40 Miles per Hour.		VELOCITY Exceeding 40 Miles per Hour.				VELOCITY Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	MAXIMUM VELOCITY.			Remarks.
	Commenced.	Direction of Wind.	Commenced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
Jan. 6-8, 1879.													
Sandwick	10 p.m. (6th).	S.E. by S.	4 a.m. (7th).	S.S.E.	48	35	8 p.m. (8th).	S.	46	1 a.m. (8th).	S.S.E.	57	—
Aberdeen	5 a.m. (7th).	S.S.E.	5 p.m. (7th).	S.S.E.	41	10	10 a.m. (8th).	S.S.E.	29	11 p.m. (7th).	S.S.E.	42	—
Alnwick Castle.	1 p.m. (7th).	S.S.E.	—	—	—	—	9 a.m. (8th).	S.E. by S.	20	1 a.m. (8th). 3 a.m. (8th).	S. by E. S.S.E.	38	30 miles were also recorded at 8 and 9 a.m., and 32 miles at 11 a.m. 7th.
Seaham -	1 p.m. (7th).	S.E.	—	—	—	—	3 p.m. (7th).	S.E. by S.	2	1&2p.m. (7th).	S.E.	30	
Armagh	7 p.m. (7th).	S.E.	—	—	—	—	10 p.m. (7th).	S.E. by S.	3	7 p.m. (7th). 9 p.m. (7th).	S.E. S.E.b.S.	32	—
	Midt. (7th).	S.E. by S.	—	—	—	—	2 a.m. (8th).	S.E. by S.	2	1 a.m. (8th).	S.E. by S.	32	—
Falmouth	4 p.m. (6th).	S.E.	—	—	—	—	Midt. (6th).	S.E. by S.	8	5, 8, & 11 p.m. (6th).	S.E. by S.	33	—
	4 a.m. (7th).	E.S.E.	—	—	—	—	3 p.m. (7th).	E. by S.	11	Noon (7th).	E.S.E.	38	—
Yarmouth	4 a.m. (7th).	E. by S.	11 a.m. (7th). 2 p.m. (7th).	E.S.E. E. by S.	40 46	1 8	Velocity did not fall below 40, this system being closely followed by No. V.		18	6, 7, & 8 p.m. (7th).	E.S.E.	49	—

No. 2. (CYCLONIC SYSTEM, No. V.)

Jan. 7-9, 1879.													
Holyhead	8 a.m. (8th).	E.	9 a.m. (8th). 7 p.m. (8th).	E. E.	44 41	7 1	Midt. (8th).	E.	16	Noon & 1 p.m. (8th).	E.	47	34 miles were also recorded at 2 a.m. 9th.
Valencia	—	—	7 a.m. (8th).	E. by S.	40	1	Noon (8th).	E.	5	7 a.m. (8th).	E. by S.	40	Wind rose to 31 miles per hour at 4 a.m. 8th.
Falmouth	4 p.m. (7th).	E.	5 a.m. (8th). 7 p.m. (8th).	E.S.E. E.N.E.	47 44	13 3	Midt. (8th).	E. by N.	32	11 a.m. (8th). 2 p.m. (8th). 3 p.m. (8th).	E. by S. E. by N. E.N.E.	51	—
Kew	7 a.m. (8th).	E.	11 a.m. (8th).	E. by N.	42	3	7 p.m. (8th).	E.N.E.	12	Noon (8th).	E. by N.	44	31 miles were also recorded at 5 a.m. and 8 p.m. 8th.
Yarmouth	—	—	10 p.m. (7th). 7 a.m. (9th).	E.S.E. E. by N.	50 40	32 1	1 p.m. (9th).	E.	39	3&6p.m. (8th).	E by N.	58	—

No. 3. (Cyclonic System, No. VI.)

Stations.	Velocity 30-40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour.				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks.
	Commenced.	Direction of Wind.	Commenced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
Jan. 9-10, 1879.													
Sandwick	7 a.m. (9th).	S.E. by S.	8 p.m. (9th).	S.E. by E.	41	2	2 a.m. (10th)	S.E.	19	8 p.m. (9th).	S.E. by E.	41	The velocity slightly exceeded 30 miles at a few other hours on the 10th.
Aberdeen.	6 p.m. (9th).	S.E. by S.	—	—	—	—	5 a.m. (10th).	S.S.E.	11	9 & 10 p.m. (9th).	S.E. by S.	35	
	6 a.m. (10th).	S.S.E.	—	—	—	—	8 a.m. (10th).	S.S.E.	2	7 a.m. (10th).	S.E.	33	—
	11 a.m. (10th).	S.E.	—	—	—	—	4 p.m. (10th).	S.E.	5	11 a.m. (10th).	S.E.	37	—
	9 p.m. (10th).	E.S.E.	—	—	—	—	1 a.m. (11th).	S.E. by E.	4	9 p.m. (10th).	E.S.E.	35	—
Holyhead	8 a.m. (10th).	E. by S.	—	—	—	—	1 p.m. (10th).	E.S.E.	5	8 a.m. (10th).	E. by S.	37	—
Valencia	6 a.m. (9th).	S.E.b.E.	7 a.m. (9th). 9 a.m. (10th).	S.E. by E. E. by S.	54 41	23 2	1 p.m. (10th).	E. by S.	31	2 p.m. (9th).	S.E.	63	—
Falmouth.	5 a.m. (9th).	E. by N.	—	—	-	—	7 a.m. (9th).	E.	2	5 a.m. (9th).	E. by N.	32	—
	9 a.m. (9th).	E. by S.	4 p.m. (9th). 5 p.m. (10th) 8 p.m. (10th).	S.E. E.S.E. E.S.E.	46 42 42	24 1 1	11 p.m. (10th).	E. by S.	38	11 a.m. (10th).	S.E. by E.	55	—
Yarmouth.	5 p.m. (9th).	E.	7 p.m. (9th) 7 a.m. (10th).	E. E.	43 45	9 1	10 a.m. (10 h).	E.	17	9 p.m. (9th).	E.	47	—

No. 4. (Cyclonic System, No. VII.)

Jan. 12-13, 1879.													
Sandwick	6 p.m. (12th).	S.E.	7 p.m. (12th).	S.E.	47	10	7 a.m. (13th).	S.	13	10 p.m. (12th).	S.E. by S.	55	—
Alnwick Castle.	3 p.m. (13th).	W.	—	—	—	—	10 p.m. (13th).	S.W.b. W.	7	5 p.m. (13th).	W. by S.	37	—
Holyhead	Noon (12th).	S.	4 p.m. (12th).	S.S.E.	46	8	2 a.m. (13th).	S. by W.	14	6 p.m. (12th).	S.S.E.	50	—
Valencia.	6 a.m. (12th).	?	—	—	—	—	Noon (12th).	?	6	8 a.m. (12th).	?	39	The record of the direction was doubtful during this period.
	1 p.m. (12th).	?	9 p.m. (12th).	?	40	1	Midt. (12th).	?	11	9 p.m. (12th).	?	40	
Falmouth	8 p.m. (12th).	S.S.W.	—	—	—	—	11 p.m. (12th).	S.S.W.	3	10 p.m. (12th).	S.S.W.	34	35 miles were also registered at 5 p.m. 12th.

No. 5. (Cyclonic System, No. X.)

Stations.	Velocity 30-40 Miles per Hour. Commenced.	Velocity 30-40 Miles per Hour. Direction of Wind.	Velocity Exceeding 40 Miles per Hour. Commenced.	Velocity Exceeding 40 Miles per Hour. Direction of Wind.	Velocity Exceeding 40 Miles per Hour. Mean Vel.	Velocity Exceeding 40 Miles per Hour. Duration in Hours.	Velocity Fell below 30 Miles per Hour. Ended.	Velocity Fell below 30 Miles per Hour. Direction of Wind.	Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity. Hour.	Maximum Velocity. Direction of Wind.	Maximum Velocity. Velocity.	Remarks.
Jan. 17-18, 1879.													
Sandwick	11 a.m. (17th).	S.E.b.S.	9 p.m. (17th). 7 p.m. (18th).	S.E. by S. S.S.E.	50 40	16 1	3 a.m. (19th).	S. by E.	40	1 a.m. (18th).	S.S.E.	61	—
Aberdeen	8 p.m. (17th).	S.S.E.	—	—	—	—	4 p.m. (18th).	S.S.E.	20	3 a.m. (18th).	S.S.E.	37	—
Alnwick Castle.	6 a.m. (18th).	S. by E.	—	—	—	—	10 a.m. (18th).	S. by E.	4	6 a.m. (18th).	S. by E.	35	Velocity was also 33 miles at 11 p.m. 17th, 35 miles at 1 a.m. 18th, and 33 miles at 4 a.m. 18th.
Holy-head.	11 p.m. (17th).	S.E. by S.	—	—	—	—	2 a.m. (18th).	S.S.E.	3	1 a.m. (18th).	S.S.E.	37	30 miles were recorded at 8 p.m., and 33 miles at 9 p.m., on the 17th.
	3 a.m. (18th).	S.S.E.	—	—	—	—	8 a.m. (18th).	S.	5	3 a.m. (18th).	S.S.E.	39	
Armagh -	4 p.m. (17th).	S.E.b.S.	6 p.m. (17th). 8 p.m. (17th).	S.E. by S. S.E. by S.	42 41	1 3	3 a.m. (18th).	S.	11	6 p.m. (17th).	S.E. by S.	42	—
Valencia -	10 p.m. (16th).	E.S.E.	1 a.m. (17th).	S.E. by E.	47	21	2 a.m. (18th).	S.W.	28	3 a.m. (17th).	S.E. by E.	54	34 miles were also recorded at 5 a.m. 18th.
Fal-mouth.	11 a.m. (17th).	S.E. by S.	—	—	—	—	3 p.m. (17th).	S.E. by S.	4	2 p.m. (17th).	S.S.E.	33	
	6 p.m. (17th).	S.S.E.	—	—	—	—	10 p.m. (17th).	S. by E.	4	6, 7, & 8 p.m. (17th).	S.S.E.	32	—
Yarmouth	7 a.m. (18th).	S.E.	—	—	—	—	3 p.m. (18th).	E.S.E.	8	11 a.m. (18th).	S.E. by E.	39	—

No. 6. (Cyclonic System, No. XI.)

Jan. 19-25 1879.													
Sand-wick.	7 a.m. (19th).	S. by E.	8 a.m. (19th). 11 a.m. (19th).	S.S.E. S.S.E.	42 42	1 1	10 p.m. (19th).	S. by E.	15	8 & 11 a.m. (19th).	S.S.E.	42	—
	11 p.m. (19th).	S.	—	—	—	—	1 a.m. (20th).	S. by E.	2	11 p.m. (19th).	S.	35	—
	3 p.m. (20th).	S.E. by S.	—	—	—	—	7 p.m. (20th).	S.E.	4	3 p.m. (20th). 6 p.m. (20th).	S.E.b.S. S.E.	33	—
Holy-head.	9 a.m. (21st).	E.	11 a.m. (21st).	E.	40	1	Noon (21st).	E. by S.	3	11 a.m. (21st).	E.	40	—
	2 p.m. (21st).	E. by N.	4 p.m. (21st). 6 p.m. (21st). 9 p.m. (21st).	E. E. E.	42 40 41	1 1 1	5 a.m. (22nd).	E. by N.	15	4 p.m. (21st).	E.	42	—
Valen-cia.	Midt. (18th).	S.E. by E.	4 a.m. (19th).	S.E. by E.	45	11	6 p.m. (19th).	S.E. by E.	18	9 a.m. (19th).	E.S.E.	50	—
	3 a.m. (20th).	E. by S.	—	—	—	—	9 a.m. (20th).	S.E. by E.	6	6 a.m. (20th).	E.S.E.	34	—
	11 a.m. (20th).	E.	—	—	—	—	1 p.m. (20th).	E. by S.	2	11 a.m. (20th).	E.	33	—

(continued)

No. 6. (Cyclonic System, No. XI.—*continued.*)

Stations.	Velocity 30–40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour.				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks.
	Commenced.	Direction of Wind.	Commenced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
Jan. 19–25, 1879.													
Falmouth.	11 a.m. (19th).	E.S.E.	5 p.m. (19th).	S.E. by E.	42	17	5 p.m. (20th).	S.E. by S.	30	9 p.m. (19th). 7 a.m. (20th).	S.E. S.E. by S.	45	—
	1 p.m. (21st).	E. by N.	—	—	—	—	4 a.m. (22nd).	E.N.E.	15	3 a.m. (22nd).	E. by N.	35	—
	6 a.m. (22nd).	E.N.E.	—	—	—	—	Noon (22nd).	E.N.E.	6	11 a.m. (22nd).	E. by N.	34	—
Yarmouth.	8 p.m. (18th).	E. by N.	—	—	—	—	Noon (19th).	E. by S.	16	2 a.m. (19th).	E. by N.	37	—
	9 p.m. (20th).	E.S.E.	6 p.m. (21st).	E. by N.	42	1	1 p.m. (22nd).	E. by N.	40	6 p.m. (21st).	E. by N.	42	—
			8 p.m. (21st).	E. by N.	40	3							
			6 a.m. (22nd).	E. by N.	40	1							
	2 p.m. (22nd).	E.N.E.	11 p.m. (22nd).	N.E. by E.	47*	17	1 p.m. (25th).	E. by N.	71	9 & 10 a.m. (23rd).	E.N.E.	*51	*Approximate.—Clock stopped between 5 and 8 a.m. on 23rd; the velocity at 4 a.m. was 50 miles and at 9 a.m. 51 miles per hour.
			5 p.m. (23rd).	E.N.E.	42	7							
			5 a.m. (24th).	N.E. by E.	40	1							
			8 a.m. (24th).	E.N.E.	41	1							
			5 p.m. (24th).	E. by N.	41	4							
			Midnt. (24th).	E. by N.	41	3							
			4 a.m. (25th).	E.N.E.	41	5							

No. 7. (Cyclonic System, No. XII.)

Jan. 31–Feb. 4, 1879.													
Holyhead	6 a.m. (3rd).	E. by N.	—	—	—	—	7 p.m. (3rd).	E. by N.	13	Noon (3rd). 1 p.m. (3rd).	E.N.E. E. by N.	38	—
Valencia.	3 a.m. (31st).	E.	—	—	—	—	5 a.m. (31st.)	E.	2	3 a.m. (31st).	E.	34	—
	8 a.m. (31st).	E.	1 p.m. (31st).	E.	40	1	9 a.m. (1st).	E.	25	4 a.m. (1st).	E.	52	—
			6 p.m. (31st).	E. by S.	45	14							
Falmouth	7 a.m. (31st).	E.S.E.	8 p.m. (31st).	E.S.E.	43	10	1 p.m. (1st).	S.E.	30	Midnt. (31st).	E.S.E.	47	—
			11 a.m. (1st).	S.E. by E.	40	1							
Yarmouth	Noon (3rd).	E.N.E.	—	—	—	—	5 a.m. (4th).	N.E.	17	4 p.m. (3rd).	E.N.E.	39	—

No. 8. (CYCLONIC SYSTEM, No. XIII.)

Stations.	Velocity 30–40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour.				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks.
	Com-menced.	Direction of Wind.	Com-menced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
Feb. 5–7, 1879.													
Glasgow	11 a.m. (6th).	S.S.W.	—	—	—	—	6 p.m. (6th).	W. by S.	7	1 p.m. (6th).	S.W.byW.	37	—
Alnwick Castle.	—	—	1 p.m. (6th). 10 p.m. (6th).	S.W.byW. W.	42 41	6 2	1 a.m. (7th).	W.S.W.	12	4 p.m. (6th).	W.S.W.	46	—
Holyhead.	10 p.m. (4th).	S. by E.	3 a.m. (5th).	S. by E.	43	11	5 p.m. (5th).	S.	19	9 a.m. (5th).	S. by E.	47	—
	4 a.m. (6th).	S. byW.	5 a.m. (6th).	S. by W.	41	1	11 a.m. (6th).	S.W. by S.	7	5 a.m. (6th).	S. by W.	41	—
	2 a.m. (7th).	S. by W.	3 a.m. (7th).	S. by W.	40	3	8 a.m. (7th).	S.S.W.	6	3 a.m. (7th).	S. by W.	41	—
Valencia.	6 p.m. (4th).	S.E.b.S.	8 p.m. (4th). 11 p.m. (4th).	S.E.byS. S.S.E.	40 43	1 4	4 a.m. (5th).	S. by W.	10	11 p.m. (4th).	S.S.E.	45	—
	1 p.m. (5th).	S.W. by S.	—	—	—	—	4 p.m. (5th).	W.S.W.	3	2 p.m. (5th).	S.W.	34	—
	7 p.m. (5th).	S.W.	9 p.m. (5th).	S.W. by S.	45	6	10 a.m. (6th).	W.	15	Midt. (5th).	S.S.W.	50	—
	9 p.m. (6th).	S.	10 p.m. (6th).	S.	45	3	3 a.m. (7th).	S.W.b.W.	6	Midt. (6th).	S.	50	—
Falmouth.	8 a.m. (5th).	S.	—	—	—	—	1 p.m. (5th).	S.W. by S.	5	9 a.m. (5th).	S. by E.	33	—
	7 a.m. (7th).	S.W.byW.	11 a.m. (7th).	S.W.byW.	41	1	10 p.m. (7th).	W. by S.	15	11 a.m. (7th).	S.W.b.W.	41	—

No. 9. (CYCLONIC SYSTEM, No. XIX.)

Stations.	Com-menced.	Direction of Wind.	Com-menced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.	Total No. of Hours the Vel. above 30 Mls.	Hour.	Direction of Wind.	Velocity.	Remarks.
Mar. 1–3, 1879.													
Sandwick	4 p.m. (1st).	W.S.W.	—	—	—	—	1 a.m. (2nd).	W.S.W.	9	9 p.m. (1st).	W.S.W.	38	—
Glasgow	1 p.m. (2nd).	S.W.	—	—	—	—	3 p.m. (2nd).	S.S.W.	2	1 p.m. (2nd).	S.W.	34	—
Alnwick Castle.	2 a.m. (2nd).	W. by N.	3 a.m. (2nd).	W.	47	2	9 a.m. (2nd).	W.S.W.	7	3 a.m. (2nd).	W.	50	—
	—	—	11 a.m. (2nd). 2 p.m. (2nd).	S.W.byW. W.S.W.	43 43	1 1	5 p.m. (2nd).	W.S.W.	6	11 a.m. (2nd). 2 p.m. (2nd).	S.W.b.W. W.S.W.	43	—
	—	—	10 p.m. (2nd).	S.W. by S.	42	2	3 a.m. (3rd).	S.W.b.W.	5	11 p.m. (2nd).	S.W.	44	—
Holyhead	10 a.m. (2nd).	S.W. by S.	—	—	—	—	2 a.m. (3rd).	S.S.W.	16	1 p.m. (2nd).	S.S.W.	38	—
Valencia.	10 a.m. (2nd).	S. by W.	—	—	—	—	4 p.m. (2nd).	S.S W.	6	1 p.m. (2nd).	S. by W.	36	—
	5 p.m. (2nd).	S.S.W.	—	—	—	—	8 p.m. (2nd).	W.N.W.	3	7 p.m. (2nd).	S.W. by S.	34	—

No. 10. (Cyclonic System, No. XX.)

Stations.	Velocity 30-40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks.
	Commenced.	Direction of Wind.	Commenced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
March 4, 1879.													
Sandwick.	4 a.m. (4th).	S. by E.	5 a.m. (4th).	S.S.E.	42	2	11 a.m. (4th).	S.W.	7	5 a.m. (4th).	S.S.E.	44	—
	Noon (4th).	S.W.byW.	1 p.m. (4th).	S.W.byW.	47	4	8 p.m. (4th).	N.W.b.W.	8	4 p.m. (4th).	W.S.W.	49	—
Aberdeen	9 a.m. (4th).	S.W.byS.	—	—	—	—	8 p.m. (4th).	W.	11	3 p.m. (4th).	S.W.byW.	36	—
										5 p.m. (4th).	W. by S.		
										7 p.m. (4th).	W. by S.		
Glasgow.	5 a.m. (4th).	S.S.W.	—	—	—	—	8 a.m. (4th).	S.W. by S.	3	5 a.m. (4th).	S.S.W.	31	—
	9 a.m. (4th)	S.W.byS.	—	—	—	—	4 p.m. (4th).	W.S.W.	7	1&2p.m. (4th).	S.W.	38	—
Alnwick Castle.	—	—	11 a.m. (4th).	S.W.byS.	49	4	3 p.m. (4th).	S.W. by S.	4	1 p.m. (4th).	S.W.	54	—
	6 p.m. (4th).	S.W.byS.	—	—	—	—	2 a.m. (5th).	S.W. by S.	8	Midt. (4th).	S.W.byW.	39	—
Seaham -	2 p.m. (4th).	S.W.byS.	—	—	—	—	6 p.m. (4th).	S.S.W.	4	2 p.m. (4th).	S.W. by S.	33	—
Holyhead	3 a.m. (4th).	S.S.W.	7 a.m. (4th).	S.S.W.	42	1	2 a.m. (5th).	S.S.W.	23	7 a.m. (4th).	S.S.W.	42	—
Armagh -	7 a.m. (4th).	S.W.byS.	—	—	—	—	6 p.m. (4th).	S.W. byS.	11	9 a.m. (4th).	S.W. by S.	39	—
Valencia -	9 p.m. (3rd).	S.W.	2 a.m. (4th).	S.W.byS.	44	15	Velocity did not fall below 30 miles, this system being closely followed by No. XXI.		20	11 a.m. (4th).	S.W. by S.	49	—

No. 11. (Cyclonic System, No. XXI.)

March 4-6, 1879.													
Sandwick	9 p m. (5th).	N.E. by E.	—	—	—	—	Midt. (5th).	N.E.	3	10 p.m. (5th).	N.E. by E.	35	—
Glasgow -	7 p.m. (5th).	S.W.	—	—	—	—	3 a.m. (6th).	W. by N.	8	8 p.m. (5th).	S.W.byW.	39	**39 miles were also recorded at 11 a.m. on 5th.**
										11 p.m. (5th).	W. by N.		
Alnwick Castle.	1 p.m. (5th).	S.W.byS.	2 p.m. (5th).	S.W.	49	2	5 p.m. (5th).	W. by S.	4	3 p.m. (5th).	S.W.byW.	53	
	8 p.m. (5th).	W. by S.	9 p.m. (5th).	W.	47	6	5 a.m. (6th).	W. by N.	9	10 p.m. (5th).	W.S.W.	57	—
Seaham	Noon (5th).	S.W.	—	—	—	—	6 p.m. (5th).	W.	6	1 p.m. (5th).	S.W. by S.	34	—
	1 a.m. (6th).	W. by S.	—	—	—	—	5 a.m. (6th).	W.N.W.	4	1 a.m. (6th).	W. by S.	34	—
Holyhead	3 a.m. (5th).	S.S.W.	7 a.m. (5th).	S.S.W.	42	1	4 p.m. (5th).	W.S.W.	13	7 a.m. (5th).	S.S.W.	42	—
Armagh -	9 p.m. (4th).	S.W.byS.	—	—	—	—	5 a.m. (5th).	S.W. by S.	8	11 p.m. (4th).	S.W. by S.	34	—
Valencia -	5 p.m. (4th)	S.W.b.S.	7 p.m. (4th).	S.W.byS.	42	1	10 a.m. (5th).	N.W.b.W.	17	7&8a.m. (5th).	S. by W.	46	—
			10 p.m. (4th).	S.W.byS.	43	12							
Falmouth	11 a.m. (5th).	S.W.	1 p.m. (5th).	S.W.	41	2	8 p.m. (5th).	S.W.	9	1 p.m. (5th).	S.W.	41	—

No. 12. (CYCLONIC SYSTEM, No. XXVI.)

Stations.	Velocity 30-40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour.				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks.
	Com-menced.	Direction of Wind.	Com-menced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
Mar. 28-29, 1879.													
Sandwick	10 p.m. (28th).	S.E. by S.	1 a.m. (29th).	S.E. by S.	44	7	10 a.m. (29th).	S. by E.	12	5 a.m. (29th.) 7 a.m. (29th.)	S.E. by S. S.S.E.	47	—
Stony-hurst.	1 a.m. (29th).	S.S.E.	—	—	—	—	3 a.m. (29th).	S.S.E.	2	1 a.m. (29th).	S.S.E.	35	—
Holyhead	5 p.m. (28th).	S.S.E.	7 p.m. (28th).	S.S.E.	47	6	2 a.m. (29th).	S. by W.	9	9 p.m. (28th).	S.S.E.	52	—
Armagh -	6 p.m. (28th).	S.E. by S.	7 p.m. (28th).	S.E. by S.	41	1	10 p.m. (28th).	S. by E.	4	7 p.m. (28th).	S.E. by S.	41	—
Valencia	—	—	10 a.m. (28th). 4 p.m. (28th).	S.E. S.W. by S.	44 43	4 3	10 p.m. (28th).	W. by S.	12	Noon (28th).	S.E. by S.	46	—
Falmouth	5 p.m. (28th).	S.	—	—	—	—	8 p.m. (28th).	S. by W.	3	7 p.m. (28th).	S.	33	—

No. 13. (CYCLONIC SYSTEM, No. XXVII.)

Mar. 29-30, 1879.													
Sandwick	7 a.m. (30th).	S.S.E.	Noon (30th).	S.S.E.	42	3	9 p.m. (30th).	S. by E.	14	Noon (30th).	S.S.E.	44	—
Aberdeen	10 a.m. (30th).	S. by E.	—	—	—	—	3 p.m. (30th).	S.S.E.	5	11 a.m. (30th).	S. by E.	36	—
Glasgow	10 a.m. (30th).	S.	—	—	—	—	4 p.m. (30th).	S. by W.	6	Noon (30th).	S.	34	—
Holyhead	1 a.m. (30th).	S.	7 a.m. (30th). 3 p.m. (30th).	S. S. by W.	44 41	7 3	10 p.m. (30th).	S.S.W.	21	11 a.m. (30th).	S.	48	—
Armagh -	7 a.m. (30th).	S. by W.	—	—	—	—	2 p.m. (30th).	S.W. by S.	7	11 a.m. (30th).	S.S.W.	39	—
Valencia	3 p.m. (29th).	S.W.	4 p.m. (29th). 7 p.m. (29th). 3 a.m. (30th).	S.W. by S. S.S.W. S.W.	47 45 45	1 7 6	2 p.m. (30th).	W. by S.	23	Midt. (29th).	S.S.W.	55	—
Falmouth	1 p.m. (30th).	S.W.	—	—	—	—	3 p.m. (30th).	S.W.	2	2 p.m. (30th).	S.W. by W.	35	—

TABLE OF ANTICYCLONIC SYSTEMS.—JANUARY 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. I. January 4-6.	No. II. January 6-11.	No. III. January 13-15.
Form	Irregular; changing considerably	Varying; on the 8th it was somewhat elliptical, its major axis lying from north-east to south-west over Scandinavia and the North Sea.	Elongated, major axis lying from south-west to north-east.
Size	Small	Large	Small.
Height	Small	Small	Small. Maximum readings 30·2 ins. to 30·6 ins.
Where first Observed	Off our west and south-west coasts	Off the north of Scotland and west of Norway.	Over Portugal and Bay of Biscay.
Direction of Motion	Southwards	South-eastwards, then stationary, and then north-eastwards and eastwards.	North-eastwards, then south-eastwards and southwards.
Rate of Motion	Rapid	Rapid till it reached the south of Norway, then stationary till 7th, then moving at a moderate rate north-eastwards and eastwards.	Slow.
Regions passed over	Our south-west coasts, the Bay of Biscay, and the west of France.	Scandinavia and northern Europe	Bay of Biscay, western France, and Spain.
Termination	Passed southwards over the Peninsula and disappeared.	Travelled away towards north-eastern Russia.	Passed back across Spain to Atlantic.
Accompanying Wind	Northerly on our west and south-west coasts, subsequently shifting to the Southward as the system passed south-eastwards.	North-easterly to Easterly on its south-eastern side. South-easterly on its western side.	Light Northerly in France at first, subsequently shifting to Southward and Westward.
„ **Weather**	Fine and bright, but cold, until the Southerly wind set in.	Fine, but cold; very cold when over northern Europe.	Fine, but rather cold till the Southerly wind set in.
REMARKS	This was apparently only an arm of high pressure extending northwards from a more permanent high-pressure system which seemed to cover the Peninsula and northern Africa.	On the 10th this area appeared merely as an arm of high pressure, stretching eastwards from a larger area which lay over eastern Russia.	On the evening of the 12th an arm of high pressure was developed over Scandinavia, and stretching south-westwards, became united with this anticyclone, forming a vast high-pressure area over Russia and central Europe on the 15th, the western part of which, however, was broken into on the following day by the formation of secondary depressions over the North Sea. These extended south-eastwards from over Holland to North Germany as an arm of low pressure. (See Note 2, p. 26.)

TABLE OF ANTICYCLONIC SYSTEMS.—JANUARY—FEBRUARY, 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. IV. January 18-21.	No. V. January 28—February 2.	No. VI. February 3-5.
Form	Nearly oval at first; major axis lying South-west to North east.	Nearly circular at first: then oval, its major axis lying from west-north-west to east-south-east.	Very irregular and constantly changing.
Size	Large	Large	Small, but increasing as it moved southwards.
Height	Small to moderate. Maximum readings 30·5 ins. (at 6 p.m. 18th) to 30·7 ins. on 21st.	Very small	Very small
Where first Observed	Over southern half of Scandinavia	Southern half of Scandinavia	Off north-east of Scotland
Direction of Motion	South-westward at first, then north-eastwards till out of our area.	Easterly and very irregular and slight at first; finally south-easterly.	South-westwards at first, and then south-eastwards.
Rate of Motion	Slow to moderate	Very slow	Slow, and very slow
Regions passed over	Scandinavia and northern Europe	Scandinavia, Denmark, and the northern and eastern parts of the North Sea.	British Isles and France
Termination	Passed away to northward of Finland	Moved south-eastwards to North Germany.	Settled down over the Mediterranean, where it broke up into two portions.
Accompanying Wind	North-easterly in Gulf of Bothnia, Easterly and South-easterly over North Sea.	Easterly to South-easterly over the North Sea and British Isles.	Very light; Easterly on its southern side, South-westerly in the north.
„ **Weather**	Cloudy and cold, especially on the 21st, when the temperature at Uleaborg fell to minus 7° Faht.	Cold; fine near its centre, dull and gloomy in our Islands, with some cold showers in the east.	Cold and dull, with fog in places
REMARKS	This anticyclone was apparently only a portion of a very large system, the bulk of which lay over eastern and northern Russia, and from which the system here described was partially detached by a shallow depression whose centre lay over North Germany at 8 a.m. on 20th.	As this system moved south-eastwards pressure became highest over Germany, southern Russia, the Black Sea, and Turkey; lowest to the westward of our Islands and over northern Europe. Cyclonic system No. XII. appeared off our western coasts during the continuance of this system, and worked its way in slowly in a south-easterly direction, filling up gradually as it did so.	This system appeared as an anticyclone of a purely temporary nature, following closely in the rear of No. V., and lying between two cyclonic systems (Nos. XII. and XIII.). After it had reached southern Europe the general distribution of pressure over Europe changed completely to one of high southern and low northern pressures. See note 4, p. 26.

TABLE OF ANTICYCLONIC SYSTEMS—FEBRUARY-MARCH, 1879.

No. VII. **February 12-15.**	No. VIII. **March 2-16.**	No. IX. **March 16-18.**
Changing constantly, but finally of an oval form	Somewhat oval; major axis lying from west to east.	Elongated; irregular.
Small, but varying greatly	Large	Small.
Small	Small	Small.
Peninsula and Bay of Biscay	Bay of Biscay	Over the Shetlands, Farö Isles, and the southern parts of Scandinavia.
North-easterly and Northerly	Irregular and very slight at first, then westerly and northerly, and finally south-easterly.	South-eastwards.
Moderate to rapid	Very slow	Slow.
France, British Isles, and North Sea	France, Bay of Biscay, and British Islands	North Sea and Germany.
Disappeared over northern Scandinavia (see note 5, p. 26).	Passed away to Mediterranean	Merged in a larger high-pressure area over south-eastern Europe on 18th.
Light and varying greatly	Light within the anticyclonic area	South-easterly on its western side, Northerly and North-westerly in the east.
Fair, but cold	Fine, cold, with local fogs	Dull on its western side, fine in the east, and cold.
By the time this anticyclone had reached Germany a well-marked depression (cyclonic system No. XVI.) appeared off our western coasts, and travelling south-eastwards and eastwards reached the neighbourhood of Caen on the morning of the 15th, and there dispersed. After the anticyclone itself disappeared, pressure became high both over north-eastern and south-western Europe, low over our Islands and their vicinity. (See cyclonic system, No. XVII.)	This system advanced over France from the westward during the night of March 1st. Pressure then increased quickly over Russia and Germany and from the 3rd a broad band of high readings lay over the countries named, having low-pressure (cyclonic) systems to the northward of it, and on some occasions to the southward and south-eastward also. The anticyclonic system was accompanied by cold, quiet weather; while north-western and northern Europe were experiencing strong South-westerly to Westerly winds, gales, and rain.	This system was pressed very closely on its western side by the cyclonic system No. XXIV. Hardly any fine weather was experienced in our Islands.

NOTES to accompany the TABLE of ANTICYCLONIC SYSTEMS for January to March 1879.

1. From January 1st to 4th.—Pressure was highest over the southern shores of the Mediterranean, lowest over the British Isles, North Sea, and Scandinavia. Occasionally an arm of high pressure of irregular form projected northwards over the Peninsula and France, but these occurrences were very temporary, and it was not till the 4th that any definite anticyclone was observed over western Europe.

2. From January 14th to January 18th.—A vast high-pressure area lay over Russia and Germany on the 14th, where the weather was very cold, the winds light and variable, chiefly from the eastward. After the 16th pressure gave way considerably on its south-western and southern sides, the main area then occupied a more northerly position than it had previously done, and ultimately a well-formed anticyclone was developed over Scandinavia. (See charts for 18th *et seq.*, and anticyclonic system No. IV.) Owing to the appearance of several depressions over our Islands and their neighbourhood during this period, some temporary anticyclones and arms or ridges of high pressure appeared over our area (see charts for 17th), but these dispersed too quickly for their history to be further referred to.

3. January 22nd to 31st.—On January 21st the barometer rose over our northern districts and an arm of high pressure extended west-south-westward across our northern districts from the high-pressure area over Finland, bringing with it very cold but fine weather to the northern half of the country. (See charts January 22nd–26th, Plate 2.) This arm subsequently underwent some modification, finally changing into a broad band which on the 28th lay from west to east over the British Isles and North Sea, uniting an anticyclone which appeared over the westward of Ireland on the 28th, with the larger system whose centre lay to the eastward of Moscow. Within this band a definite anticyclone appeared subsequently, the particulars of which will be found in the table (No. V.). During the whole of this time and until February 2nd, pressure remained high over eastern Russia with very cold weather.

4. February 6th to 11th.—For a long time after the disappearance of anticyclone No. VI. pressure continued highest over Spain and northern Africa, lowest over and to the northward of our Islands, where depressions of considerable importance occurred, and threw off shoots to the eastward, accompanied by Southerly to Westerly winds, and mild, unsettled weather. After February 10th pressure increased over northern Europe also, and until the 12th two high-pressure areas prevailed, one over northern Europe, the other over the southern parts of the Mediterranean and the Peninsula—the two being separated by a band (or trough) of low pressure, in which were cyclonic systems of varying intensity. Pressure then gave way in the far north, and system No. VII. appeared.

5. February 16th to 20th.—After the disappearance of the anticyclonic system No. VII. pressure remained high for some days both over north-eastern Europe and the Peninsula, the two regions bring separated by an arm or band of low pressure, which extended in a south-easterly and easterly direction across our Islands to Germany, and subsequently to the Baltic. (See cyclonic system No. XVII.) On February 19th the more southern of these two areas, having extended northwards over France, stretched out an arm in a northerly direction over Denmark and the south of Norway, which separated a low-pressure system over the Baltic from another such system over and to the westward of Scotland. This arm gradually moved eastward, and low-pressure systems became general over the British Isles and their neighbourhood.

After February 23rd pressure became high over northern Europe, and also to the northward and westward of our Islands, while depressions appeared over southern and central Europe, but no definite anticyclone was formed in our neighbourhood. On February 26th pressure began to give way on our northern coasts; a band of high pressure was formed over our Islands, uniting an anticyclonic system over northern Europe with another over the Atlantic, the north-eastern extremity of which lay over Ireland and the north-western parts of England at 8 a.m. The northern high-pressure system soon gave way, while that in the west advanced very little indeed till March 2nd, when it developed into a well-marked anticyclone over France. (See anticyclonic system No. VIII.)

SECTION III.

Remarks for January 1879.

(*Tables A. to C., January, with Monthly Wind and Weather Charts.*)

Wind.—The prevailing winds during the month of January were Easterly over the greater part of the kingdom, but with a large admixture of Southerly winds in Scotland, and North-easterly winds on our south and south-east coasts. During the first five days the wind was North-westerly in the north and east, and very variable in the south-west and south; it then fell to a calm, and on the following day breezes from the South-eastward set in, then increased to a gale, and backing towards East and North-east in many places, fell light by the 11th. The next change was to a spell of Southerly breezes, which came over us on the 12th, and veering to South-west, occasionally blew strongly during the 13th and 14th, but veered to West and died out on the 15th. From January 16th to 18th the winds were mainly South-easterly, but after that date they became more decidedly Easterly, except in the far north, and occasionally blew strongly in the Channel.

Pressure.—The mean pressure of the atmosphere at the level of the sea ranged from a little above 30·05 inches over the north-eastern counties of England to a little below 29·95 inches in the Hebrides and in Cornwall, and to about 29·87 inches in the extreme south-west of Ireland. The lowest readings observed occurred on the 1st over the northern parts of Great Britain, in the rear of a large depression which was at that time passing away towards the west of Norway. In the south-east of England the lowest reading was registered on the 3rd, at which time a subsidiary disturbance (see Table of cyclonic system No. II.) lay close to London, while over our south-western counties the lowest was recorded on the 8th, when a well-marked depression (No. V.) came close to our south-west coasts, and, passing south-eastward, reached the Mediterranean by the following morning. Armagh stands alone in the date of its minimum, the lowest readings at that observatory having occurred on the 15th, when cyclonic system No. VIII. passed over the north of Ireland in its journey north-eastward. None of the minima were very low, the lowest being only 29·110 inches at Aberdeen. At Stonyhurst the lowest sea-level pressure recorded was only 29·429 inches. The maximum readings occurred all over the country between the 27th and 29th, they ranged from about 30·45 inches at our extreme south-western observatories to 30·58 inches at Aberdeen, and 30·59 inches at Armagh. They all occurred during the prevalence of an area of high pressure which stretched westward from a large anticyclonic system whose centre lay apparently over the Baltic. The range was nowhere very large, the maximum amounts shown at the observatories being 1·468 inch at Aberdeen and 1·409 inch at Valencia, while the minimum was only 1·093 inch at Stonyhurst.

Movements of Depressions.—These, as a rule, followed one of two very distinct directions. Appearing off our south-west coasts, they travelled either in a north-north-easterly direction up our west and north-west coasts, or else moved south-eastwards and passed by or over the mouth of the English Channel towards France or the Peninsula. One, however, No. II., moved nearly easterly until it reached the neighbourhood of London, when it travelled east-north-eastwards and then north-north-eastwards, and finally dispersed near Fanö on the 3rd.

High-pressure areas have been very prevalent, their centres lying chiefly over or to the eastward of the North Sea. The most important occurred during the latter half of the month and took the form of an arm or band of high readings stretching south-westward and westward over our Islands, from a large anticyclonic system which lay over northern Europe and the Baltic.

Temperature.—The distribution of mean temperature (at the sea level) during January was very clearly defined, ranging from about 31° over the inland parts of England and Scotland, and a little below 33° over the central parts of north Ireland, to about 36° at Sumburgh Head, Stornoway, and on the south coast of England, and to nearly 42° on the south-west coast of Ireland. These values are lower than the means for the 13 years 1857–69 shown on Mr. Buchan's chart for January, by 7° over the inland districts of Great Britain, by 6° over the coldest districts of Ireland, and by about 2° along our north-east coasts, but over the extreme south-western districts of England the deficit does not exceed 4° or 5°, and in the south of Ireland it is even less. The lowest readings recorded during the month occurred early on the 12th at most of the observatories, during the temporary anticyclonic period which occurred between the disappearance of the small depression (No. VI.) of the 11th and the new one which approached our western coasts on the following day. At Aberdeen, however, the cold on that occasion was less severe than that of the morning of the 3rd (when also a temporary anticyclonic ridge prevailed), and at Valencia the minimum reading was shown on the morning of the 25th, when the high-pressure band, already referred to more than once, lay over the country. The highest readings, also, were felt on very various dates, our north-western and northern districts having recorded their highest on the 13th or 14th, our southern districts on the 1st, and Valencia on the 17th. In each case a cyclonic Southerly (South-east to South-west) wind prevailed, with dull, wet weather. The range for the month varied from nearly 37° at Churchstoke, 35° at Strathfield Turgiss, and 34° at Glenalmond, to 30°·3 at Kew, and 27°·8 at Armagh, to rather less than 24° both at Valencia and Aberdeen, and to 22° at Scilly.

Vapour Tension, like mean temperature, was highest at our extreme south-western stations, where it ranged from 0·20 inch to 0·24 inch, and lowest over the inland parts of England, where it varied from 0·14 inch to 0·17 inch. In all cases the inland values were lower than those for the coast stations. *Relative Humidity*, however, was higher at the northern and eastern coast stations than elsewhere.

Rainfall was very heavy over our extreme south-western districts, slight at the eastern and north-eastern stations. The amounts reported were as high as 7·3 inches at Valencia, 7·7 at Roche's Point, about 6·5 at Scilly and Babbacombe, 9·1 at Plymouth, and 9·5 at Dartmoor, while over our north-eastern counties the fall ranged from 0·8 inch to 1·2 ins. At Laudale (Loch Sunart) the aggregate amount was only 1·7 ins.

TABLE A., JANUARY.—SHOWING the MEAN and EXTREME PRESSURES and TEMPERATURES recorded at each of the SEVEN SELF-RECORDING OBSERVATORIES of the METEOROLOGICAL OFFICE during the Month of JANUARY 1879, together with the EXTREME RANGE of each, the MONTHLY VAPOUR TENSION, the RELATIVE HUMIDITY, and TOTAL RAINFALL.

NAMES OF OBSERVATORIES.	PRESSURE at 32° F. and the Mean Sea Level (In English Inches).						TEMPERATURE In the Shade (In Degrees Fahrenheit).						HYGROMETRIC VALUES.		RAINFALL (In English Inches).
	Mean for the Month.	Extremes.				Range.	Mean for the Month.	Extremes.				Range.	Tension of Vapour (In English Inches).	Relative Humidity (Saturation = 100).	
		Minimum.		Maximum.				Minimum.		Maximum.					
		Reading.	Date.	Reading.	Date.			Reading.	Date.	Reading.	Date.				
	ins.	ins.	D. H.	ins.	D. H.	ins.	°	°	D. H.	°	D. H.	°	in.	%	ins.
Valencia - -	29·873	29·151	8th, 5 a.m.	30·560	27th, 10 p.m.	1·409	41·5	28·6	25th, 9 a.m.	52·4	17th, 9 p.m.	23·8	0·221	85	7·381
Armagh - -	30·013	·409	15th, 4 a.m.	·586	27th, 8 p.m.	1·177	33·6	20·3	12th, 4 a.m.	48·1	14th, 1 p.m.	27·8	·162	84	1·727
Glasgow - -	·035	·265	1st, 1 a.m.	·503	27th, 8 p.m.	1·238	31·3	17·8	12th, 7 a.m.	45·2	14th, 2 p.m.	27·4	·141	79	1·249
Aberdeen -	30·058	·110	1st, 1 a.m.	·578	29th, 7 p.m. 8 p.m.	1·468	33·5	18·1	3rd, 7 a.m.	42·0	13th, 1 p.m.	23·9	·158	82	1·680
Falmouth -	29·953	·240	8th, 9 a.m.	·434	27th, 10 p.m.	1·194	39·1	24·7	12th, 2 a.m.	51·4	1st, 5 p.m.	26·7	·202	85	9·070
Stonyhurst -	30·058	·429	1st, 1 a.m.	·522	27th, 8 p.m.	1·093	30·6	18·6	12th, 8 a.m.	44·6	14th, 2 p.m.	26·0	·130	75	1·374
Kew - -	30·034	29·349	3rd, 9 a.m.	30·457	27th, 8 p.m.	1·108	32·6	21·0	12th, 7 a.m.	51·3	1st, 2 a.m.	30·3	·153	83	2·705

TABLE B., JANUARY.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at
The values are not

(The Stations are grouped in Districts, and then arranged in order of

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 9 a.m. and 9 p.m.	AIR TEMPERATURE.									
			At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Means of			Absolute Extremes.			
						Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.
		ins.	°	°	°	°	°	°	°		°	
0. SCOTLAND, N. -	Orkneys (Sandwick Manse) -	30·001	34·1	34·8	34·5	31·0	38·7	34·9	15·4	3rd	43·5	15th
1. SCOTLAND, E. -	Glenalmond - - -	30·081	26·9	29·2	28·1	22·7	34·5	28·6	11·0	20th	45·0	1st
2. ENGLAND, N.E. -	Seaham - - -	30·062	33·5	33·2	33·4	29·1	37·2	33·2	18·8	27th	47·7	1st
	Durham* - - -	30·069	31·0	29·0	30·0	25·3	35·4	30·4	7·6	27th	46·8	1st
	Hull - - - -	30·081	32·3	32·2	32·3	29·4	37·4	33·4	20·0	4th	59·0	1st
	Kelstern 𝔐 - - -	30·075	30·4	29·6	30·0	27·2	34·1	30·7	18·9	4th	47·5	1st
3. ENGLAND, E. -	Hillington 𝔐 - - -	30·051	31·2	30·3	30·8	26·3	35·2	30·8	7·0	11th	49·7	1st
	AudleyEnd(SaffronWalden)𝔐	30·041	30·7	30·0	30·4	25·8	34·8	30·3	15·0	6th	51·4	1st
	Chigwell Row - - -	30·066	31·8	31·2	31·5	28·1	35·6	31·9	18·3	12th	50·0	1st
4. MIDLAND COUNTIES.	Wakefield 𝔐 - - -	30·071	30·8	31·5	31·2	26·5	35·8	31·2	13·7	4th	49·7	1st
	Buxton 𝔐 - - -	30·084	27·9	28·0	28·0	23·3	32·7	28·0	10·0	11th	45·4	1st
	Cheadle 𝔐 - - -	30·067	28·6	29·0	28·8	25·6	33·4	29·5	17·3	11th	48·1	1st
	Leicester - - -	30·058	30·1	30·6	30·4	26·6	34·9	30·8	17·0	11th	50·6	1st
	Uppingham - - -	30·058	29·4	28·6	29·0	25·6	35·0	30·3	17·7	11th	48·1	1st
	Oscott - - - -	30·055	28·8	28·8	28·8	25·4	34·1	29·8	17·5	23rd	49·1	1st
	Churchstoke 𝔐 - -	30·074	28·3	29·5	28·9	24·4	33·8	29·1	12·8	11th	49·1	1st
	Cheltenham 𝔐 - -	30·042	31·1	30·8	31·0	26·1	35·4	30·8	12·8	12th	50·1	1st
5. ENGLAND, S. -	Marlborough 𝔐 - -	30·045	29·8	29·6	29·7	26·5	35·4	31·0	14·7	12th	49·0	1st
	Strathfield Turgiss 𝔐 -	30·037	32·1	30·5	31·3	26·6	35·9	31·3	15·1	11th	50·1	1st
	Ramsgate 𝔐 - - -	30·052	33·3	33·4	33·4	30·3	37·3	33·8	21·6	12th	50·3	1st
	Folkestone - - -	30·031	33·3	33·2	33·3	29·9	37·1	33·5	21·7	12th	49·8	1st
	Southampton - - -	30·015	33·0	33·0	33·0	30·2	37·1	33·7	16·1	12th	51·9	3rd
	Hastings - - -	30·023	33·3	33·4	33·4	30·8	36·8	33·8	21·2	12th	50·0	1st
6. SCOTLAND, W. -	Laudale - - -	29·998	35·1	35·4	35·3	29·5	39·3	34·4	22·1	11th	52·8	13th
7. ENGLAND, N.W. -	Douglas (I. of Man) - -	30·030	34·6	33·3	34·0	29·5	37·6	33·6	18·0	12th	47·0	1st, 13th
	Llandudno 𝔐 - - -	30·038	33·7	33·3	33·5	30·2	37·7	34·0	19·1	11th	50·0	14th
8. ENGLAND, S.W. -	St. David's - - -	29·982	34·5	34·2	34·4	30·9	38·4	34·7	20·4	11th	49·9	1st
	Caermarthen 𝔐 - -	30·009	32·9	32·2	32·6	28·4	38·8	33·6	14·1	11th	52·9	1st
	Dartmoor 𝔐 - - -	29·970	30·0	30·3	30·2	26·9	34·7	30·8	15·0	11th, 12th	46·6	3rd
	Babbacombe 𝔐 - -	29·981	35·9	35·7	35·8	32·6	39·8	36·2	19·1	12th	52·8	13th
9. IRELAND, N. -	Londonderry - - -	30·007	33·7	33·2	33·5	30·0	37·1	33·6	19·8	24th	46·0	14th
	Brookeborough - -	29·932	31·6	31·5	31·6	27·2	37·9	32·6	11·8	12th	47·9	18th
	Markree Castle - -	29·973	31·4	31·5	31·5	26·8	38·6	32·7	13·4	12th	47·8	13th
10. IRELAND, S. -	Dublin - - - -	30·009	34·8	35·1	35·0	31·7	38·9	35·3	21·2	12th	49·4	13th
	Parsonstown - - -	29·977	33·1	33·4	33·3	28·2	40·0	34·1	18·4	12th	50·5	13th
CHANNEL - -	Jersey (St. Aubin's) - -	29·994	37·7	37·7	37·7	34·5	40·9	37·7	25·0	11th	52·6	18th

NOTE.—The stations marked thus 𝔐 are in connection with the Royal Meteorological Society.

* At Durham the observations were taken at 10 a.m. and 10 p.m. each day.

STATIONS of the SECOND ORDER in the BRITISH ISLANDS, during the Month of JANUARY 1879. corrected for Diurnal Range.

Latitude, beginning in each case with the Station lying furthest North.)

TENSION OF VAPOUR.			RELATIVE HUMIDITY.			AMOUNT OF CLOUD (0 to 10).			RAINFALL.			WEATHER, No. of Days of							WIND, No. of Observations of								
At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
in.	in.	in.	%	%	%				ins.	ins.																	
·183	·182	·183	92	91	92	6·5	7·0	6·8	2·360	·390	3rd, 12th	18	3	2	0	4	15	12	2	0	4	17	13	6	3	7	10
·130	·138	·134	87	85	86	6·0	7·1	6·6	2·263	·540	12th	11	12	0	0	3	11	1	1	6	15	4	1	7	13	8	4
·164	·167	·166	85	88	87	7·6	6·1	6·9	1·340	·420	11th	13	12	5	0	3	16	1	1	0	13	12	6	8	10	7	5
·159	·142	·151	90	87	89	7·5	6·1	6·8	0·848	·168	11th	13	14	1	0	5	15	0	3	1	7	15	9	5	6	11	5
·168	·167	·168	91	91	91	7·9	7·1	7·5	1·050	·380	14th	18	12	0	0	2	17	0	5	10	14	9	4	3	9	6	2
·141	·142	·142	82	85	84	7·6	6·8	7·2	1·293	·700	14th	11	10	2	0	2	16	0	6	9	20	7	2	4	3	9	2
·146	·145	·146	82	84	83	8·1	8·0	8·1	1·153	·396	14th	10	15	0	0	2	20	0	1	15	11	18	2	6	3	6	0
·148	·148	·148	84	87	86	8·0	6·9	7·5	2·140	·800	1st	11	14	0	0	3	18	0	0	36	0	8	0	4	1	10	3
·170	·165	·168	95	94	95	8·8	7·5	8·2	2·370	1·100	1st	10	12	0	0	0	17	0	5	12	21	8	3	3	0	8	2
·153	·160	·157	88	90	89	7·2	7·4	7·3	1·300	·380	14th	9	3	0	0	1	15	0	8	11	15	4	4	1	10	6	3
·126	·125	·126	82	80	81	7·6	6·8	7·2	2·430	·790	14th	8	5	0	0	2	14	0	2	7	17	16	2	3	1	9	5
·133	·142	·138	85	89	87	8·0	6·8	7·4	2·240	·590	14th	6	11	0	0	2	17	4	6	9	23	10	4	0	2	3	5
·139	·153	·146	82	90	86	8·4	7·4	7·9	1·330	·290	14th	11	9	0	0	2	20	0	0	25	9	4	1	5	3	2	13
·145	·145	·145	88	90	89	8·0	7·5	7·8	1·492	·402	14th	9	17	0	0	2	20	0	5	13	16	7	4	3	3	6	5
·139	·141	·140	86	87	86	8·9	7·5	8·2	2·040	·450	18th	10	15	1	0	0	21	0	4	24	14	3	4	3	4	6	0
·132	·143	·138	81	86	84	7·2	8·0	7·6	1·478	·507	2nd	11	9	0	0	0	15	0	3	11	23	7	5	4	8	1	0
·171	·165	·168	96	95	95	7·8	6·9	7·4	2·510	·940	1st	13	7	0	0	4	18	2	3	13	18	12	3	3	5	4	1
·150	·149	·150	88	89	88	8·3	7·5	7·9	4·017	1·480†	1st	12	8	1	0	2	20	0	1	22	15	0	2	2	1	2	17
·152	·141	·147	80	81	81	8·1	8·2	8·2	3·429	1·399	1st	9	7	1	0	2	22	0	3	22	7	13	1	3	3	3	7
·170	·164	·167	87	84	86	8·2	7·5	7·9	2·220	1·050	1st	9	3	7	0	1	19	2	3	30	5	0	1	5	7	3	8
·167	·164	·166	85	84	84	8·5	8·0	8·3	2·600	1·050	1st	9	4	1	0	2	21	1	4	7	32	2	3	3	5	6	0
·165	·161	·163	83	82	83	9·0	7·5	8·3	4·307	1·425	1st	13	4	0	0	0	21	0	0	24	14	8	1	5	4	4	2
·166	·162	·164	83	82	82	8·4	8·3	8·4	3·770	1·690	1st	10	3	1	0	2	24	3	3	34	5	2	4	5	2	5	2
·178	·179	·179	86	86	86	5·4	4·4	4·9	1·710	·530	17th	8	9	0	0	9	6	6	7	7	11	19	8	5	0	1	4
·178	·167	·173	88	86	87	7·9	6·3	7·1	3·618	1·946	12th	8	8	3	0	0	15	7	1	2	20	15	1	2	3	4	14
·162	·159	·161	82	83	83	6·7	5·4	6·1	0·815	·260	17th	9	4	1	0	4	13	1	0	5	21	15	8	1	7	5	0
·176	·182	·179	85	90	88	7·1	7·3	7·2	3·590	·790	17th	12	3	0	0	0	13	1	3	21	18	10	2	2	4	2	0
·178	·173	·176	93	94	93	6·8	7·2	7·0	3·530	·660	12th	10	4	0	0	4	18	0	7	6	27	6	0	1	1	4	10
·167	·168	·168	96	97	97	8·4	7·3	7·9	9·540	1·540	2nd	15	6	1	0	1	20	11	3	8	29	4	3	3	1	2	9
·182	·181	·182	82	83	83	8·4	7·6	8·0	6·350	1·460	1st	15	10	2	0	2	20	5	5	17	18	5	4	5	4	3	1
·173	·170	·172	89	88	88	7·5	5·3	6·4	1·430	·280	17th	18	10	6	0	2	10	0	2	7	5	12	6	5	5	3	17
·159	·166	·163	89	94	92	8·0	6·1	7·1	3·070	·765	18th	9	‡	‡	‡	4	16	8	0	8	15	2	1	5	1	0	30
·158	·162	·160	87	90	88	6·5	6·9	6·7	1·062	·289	12th	14	4	2	0	4	15	0	1	2	8	22	4	2	0	1	22
·168	·169	·169	81	81	81	7·0	7·2	7·1	1·714	·473	7th	10	9	9	0	2	12	7	2	2	13	22	3	3	12	2	3
·172	·172	·172	89	88	89	6·9	6·4	6·7	1·683	·388	17th	15	1	1	0	5	14	2	3	5	5	13	10	8	1	1	16
·201	·198	·200	86	85	86	9·2	7·8	8·5	4·209	·732	3rd	16	3	1	1	2	23	4	2	11	26	6	5	5	4	0	3

† Approximate.

‡ No observations.

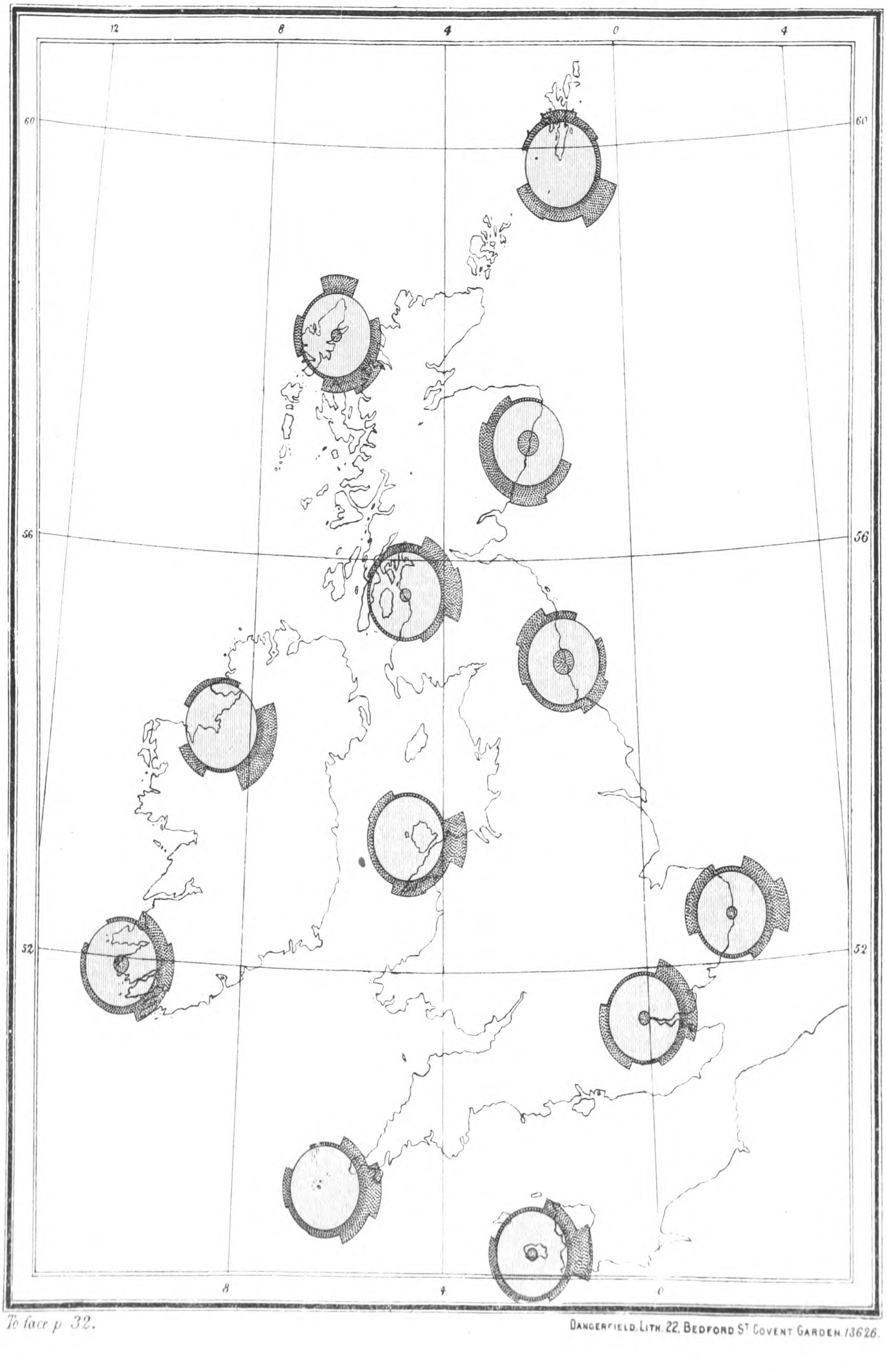
TABLE C., JANUARY.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at TELEGRAPHIC REPORTING STATIONS in the BRITISH ISLANDS during the Month of JANUARY 1879. Observations are made at 8 a.m. daily.

(The Stations are grouped in Districts, and then arranged in order of Latitude, beginning in each case with the Station lying furthest North.)

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 8 a.m.	AIR TEMPERATURE. Means of At 8 a.m.	AIR TEMPERATURE. Means of Minima.	AIR TEMPERATURE. Means of Maxima.	AIR TEMPERATURE. Means of Min. and Max. combined.	AIR TEMPERATURE. Absolute Extremes. Minimum.	AIR TEMPERATURE. Absolute Extremes. Date.	AIR TEMPERATURE. Absolute Extremes. Maximum.	AIR TEMPERATURE. Absolute Extremes. Date.	TENSION OF VAPOUR.	RELATIVE HUMIDITY.	AMOUNT OF CLOUD.	RAINFALL. Total Fall in the Month.	RAINFALL. Maximum Fall in One Day.	RAINFALL. Date.	WEATHER, No. of Days of Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	WIND, No. of Observations of North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
		ins.	°	°	°	°	°		°		in.	%		ins.	ins.																	
0. SCOTLAND, N.	Sumburgh Head	29·993	36·7	32·8	39·2	36·0	25	1st, 2nd, 3rd.	44	13th, 14th, 27th.	·187	87	8·0	0·99	0·21	3rd	22	4	0	0	2	18	8	4	2	1	11	5	6	0	2	0
	Thurso	29·994	33·5	28·9	38·1	33·5	17	23rd	45	28th	·178	93	6·6	2·17	0·36	1st	20	10	0	0	4	10	3	4	1	2	9	5	4	0	1	5
	Wick	29·992	34·8	29·9	38·7	34·3	20	3rd	45	15th	·170	84	7·0	1·27	0·26	1st	16	4	0	0	5	16	6	3	0	1	2	12	5	3	5	0
	Stornoway	29·928	35·8	31·7	38·7	35·2	23	12th	45	14th	·190	90	4·7	1·37	0·43	17th	13	2	0	0	13	8	7	7	0	4	8	6	1	3	1	1
1. SCOTLAND, E.	Nairn	29·996	31·0	27·7	36·4	32·1	18	12th, 13th	46	14th	·153	88	3·4	0·59	0·25	3rd	8	7	0	0	13	3	0	0	0	2	3	1	4	8	4	9
	Aberdeen	30·032	32·3	28·7	36·6	32·7	12	3rd	42	14th	·150	82	5·9	1·97	0·37	14th	19	13	3	0	8	12	5	1	0	0	5	7	5	5	4	4
	Leith	30·015	31·0	26·3	37·6	32·0	17	13th	49	14th	·161	93	6·1	1·24	0·63	12th	10	8	0	0	8	13	0	0	0	4	10	1	0	10	1	5
2. ENGLAND, N.E.	Shields	30·058	32·4	28·9	36·7	32·8	15	27th	46	13th	·160	87	8·2	1·22	0·28	12th	12	13	12	0	4	21	3	3	0	3	6	2	2	4	7	4
	Scarborough	30·051	34·2	32·1	36·9	34·5	27	10th, 11th	43	13th, 14th, 15th.	·178	88	8·5	1·14	0·49	14th	11	6	5	0	4	23	2	1	2	7	6	3	1	5	5	1
	York	30·059	31·1	27·4	36·2	31·8	19	4th	46	13th	·163	93	7·3	1·13	0·48	14th	10	1	0	0	7	19	0	6	3	8	2	2	2	3	5	0
3. ENGLAND, E.	Yarmouth	30·033	32·6	29·4	34·7	32·1	19	12th	44	1st	·169	91	8·3	1·11	0·23	1st, 2nd	14	9	3	0	3	20	6	1	5	11	4	1	1	4	3	1
	Cambridge	30·035	30·3	26·2	36·2	31·2	17	12th	46	1st, 15th	·154	91	7·4	2·04	0·65	1st	10	7	0	0	8	21	0	4	7	9	2	1	4	3	1	0
4. MIDLAND COUNTIES.	Nottingham	30·061	29·1	25·2	35·3	30·3	14	6th	46	14th	·141	88	7·8	1·56	0·44	18th	10	10	0	0	5	22	0	6	5	2	5	2	3	1	1	6
	Oxford	30·025	30·4	27·3	35·0	31·2	17	12th, 13th	47	14th	·156	91	7·9	3·06	1·00	1st	10	8	0	0	5	21	0	1	9	7	3	2	1	4	1	3
5. ENGLAND, S.	London	30·015	31·8	28·6	36·5	32·6	18	12th, 13th	51	1st	·166	91	7·1	2·81	1·15	1st	14	11	0	0	6	17	0	1	8	9	2	1	4	4	1	1
	Dover	30·017	33·8	31·1	37·5	34·3	24	10th, 11th	50	3rd	·172	88	5·6	2·05	0·63	1st	11	3	1	0	2	4	1	3	5	9	5	0	4	1	4	0
	Hurst Castle	29·988	34·3	31·6	39·9	35·8	20	12th, 13th	49	1st	·182	92	7·9	4·29	1·27	1st	14	4	0	0	2	17	3	3	8	7	5	2	1	3	2	0
6. SCOTLAND W.	Ardrossan	30·019	32·3	28·8	38·5	33·7	22	12th	47	15th	·155	83	5·1	1·81	0·68	17th	10	2	0	0	12	10	0	3	8	12	2	1	1	1	2	1
7. ENGLAND, N.W.	Liverpool	30·031	31·0	28·0	35·4	31·7	12	11th	48	13th	·144	82	7·2	1·52	0·45	12th, 17th	6	2	0	0	7	17	0	0	3	14	6	0	2	3	2	1
	Holyhead	29·991	34·4	31·4	38·7	35·1	24	11th, 26th	49	2nd, 14th	·168	83	5·1	1·67	0·55	12th	10	2	0	0	13	8	1	1	1	11	5	6	2	2	3	0
8. ENGLAND, S.W.	Pembroke	29·958	35·5	32·3	39·1	35·7	22	11th, 12th	48	14th	·174	84	7·1	3·49	0·75	17th	11	1	0	0	4	15	8	4	6	12	4	1	1	3	0	0
	Prawle Point	29·968	36·4	32·7	40·0	36·4	19	12th	50	1st, 2nd, 18th.	·196	91	8·8	3·42	0·89	1st	17	3	0	0	2	25	5	2	9	10	3	0	4	2	1	0
9. IRELAND, N.	Greencastle	29·963	34·5	30·1	39·2	34·7	18	24th	48	14th, 18th	·174	86	8·6	2·00	0·35	12th	18	6	0	0	3	25	0	3	3	7	8	2	4	2	2	0
	Donaghadee	30·023	34·4	30·8	38·0	34·4	21	12th	46	13th, 14th	·181	91	5·5	2·58	0·86	17th	14	0	0	0	9	8	8	1	1	5	9	4	4	6	1	0
	Mullaghmore	29·935	36·8	33·1	40·1	36·6	24	12th	49	13th, 14th, 18th.	·186	86	7·0	1·51	0·28	17th	11	3	1	0	5	12	13	2	0	10	11	1	5	0	2	0
10. IRELAND, S.	Kingstown	29·979	36·7	33·3	39·5	36·4	27	6th, 12th	50	12th	·180	84	7·4	2·16	0·79	7th	11	0	0	0	4	16	7	0	0	8	8	5	1	5	4	0
	Valencia	29·866	41·0	35·3	46·6	41·0	27	26th	54	17th	·215	84	7·7	7·37	2·84	19th	20	0	0	0	3	18	9	1	6	9	7	2	2	2	0	2
	Roche's Point	29·927	38·6	35·3	42·9	39·1	25	26th	50	13th	·214	92	7·4	7·70	1·10	31st	19	1	0	0	5	17	10	3	7	4	12	1	2	2	0	0
CHANNEL ISLANDS	Scilly	29·902	42·5	39·4	45·2	42·3	31	24th	53	13th	·240	88	9·2	6·45	1·11	6th	19	1	0	0	0	25	4	1	5	12	6	2	2	3	0	0
	Jersey	29·912	37·4	34·8	39·9	37·4	25	11th	52	1st	·200	90	8·5	4·66	1·02	6th	17	2	1	0	1	21	7	1	6	13	3	1	2	3	1	1

MONTHLY WIND CHART. JANUARY 1879.

Showing the Relative Prevalence of Wind for 8 points.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8
4
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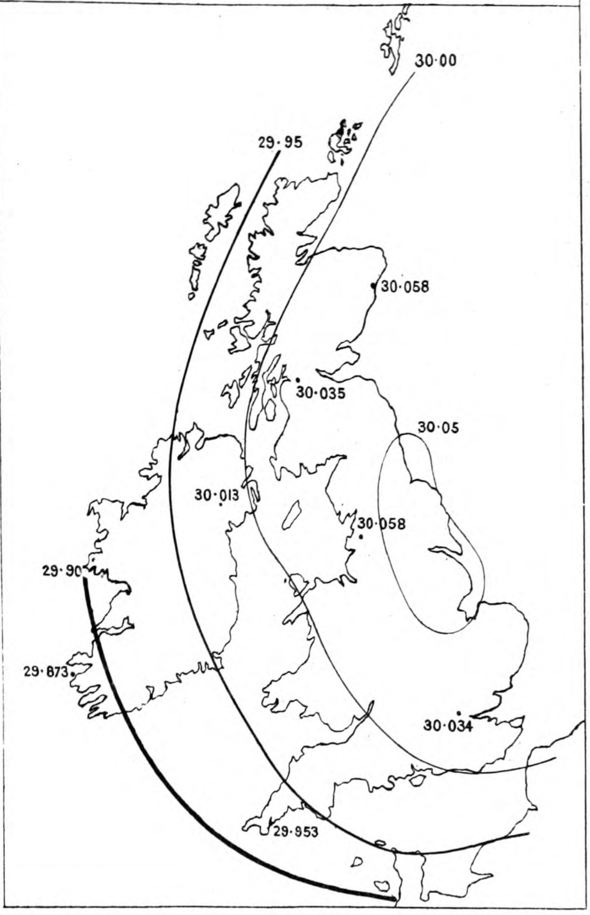
4
60
60
56
56
52
52
8
4
0

To face p. 32.

DANGERFIELD, LITH. 22, BEDFORD ST COVENT GARDEN. 13626.

MONTHLY WEATHER CHART. JANUARY 1879.

1. DISTRIBUTION OF MEAN PRESSURE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30·05
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30·034
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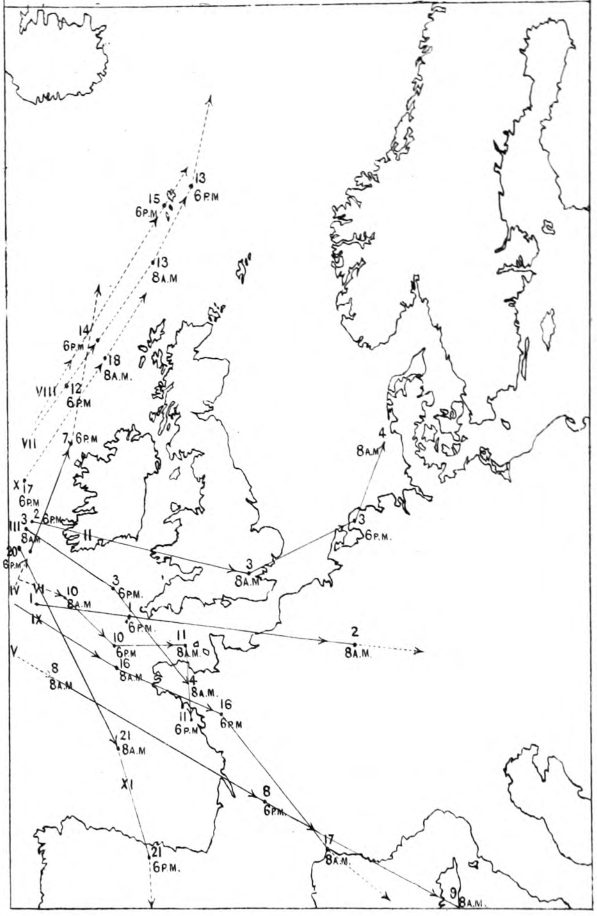
2. MOVEMENTS OF DEPRESSIONS.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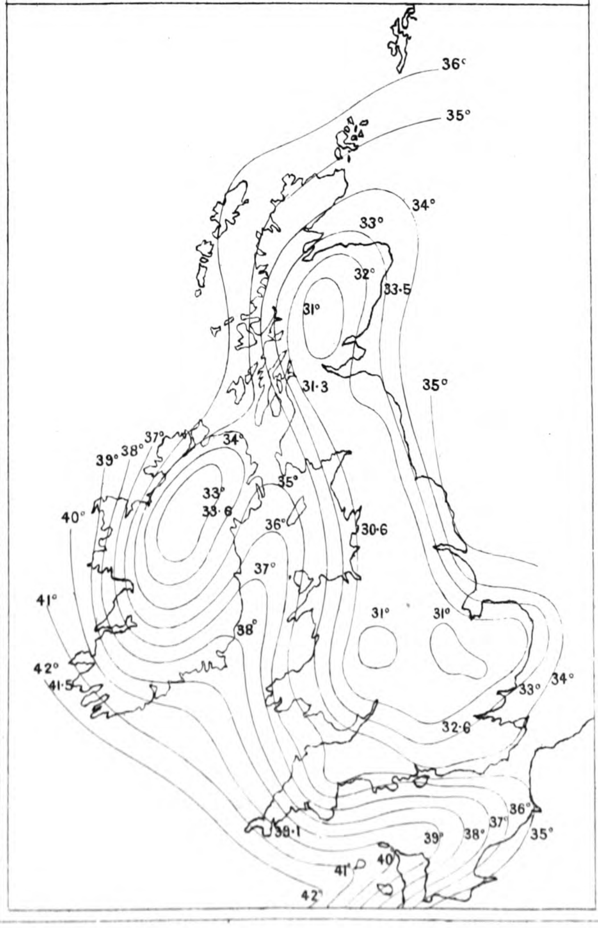
15
6 P.M.
13
8 A.M.
14
6 P.M.
18
8 A.M.
VIII
12
6 P.M.
VII
7
6 P.M.
X
17
6 P.M.
III
3
8 A.M.
2
6 P.M.
20
6 P.M.
IV
VI
10
8 A.M.
I
IX
V
8
8 A.M.
3
6 P.M.
10
6 P.M.
16
8 A.M.
11
8 A.M.
14
8 A.M.
11
6 P.M.
16
6 P.M.
21
8 A.M.
XI
21
6 P.M.
8
6 P.M.
17
8 A.M.
9
8 A.M.
3
8 A.M.
3
6 P.M.
4
8 A.M.
2
8 A.M.

3. DISTRIBUTION OF MEAN TEMPERATURE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33°
32°
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37°
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38°
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33°
33·6
35°
36°
40°
30·6
37°
41°
31°
31°
38°
42°
41·5
33°
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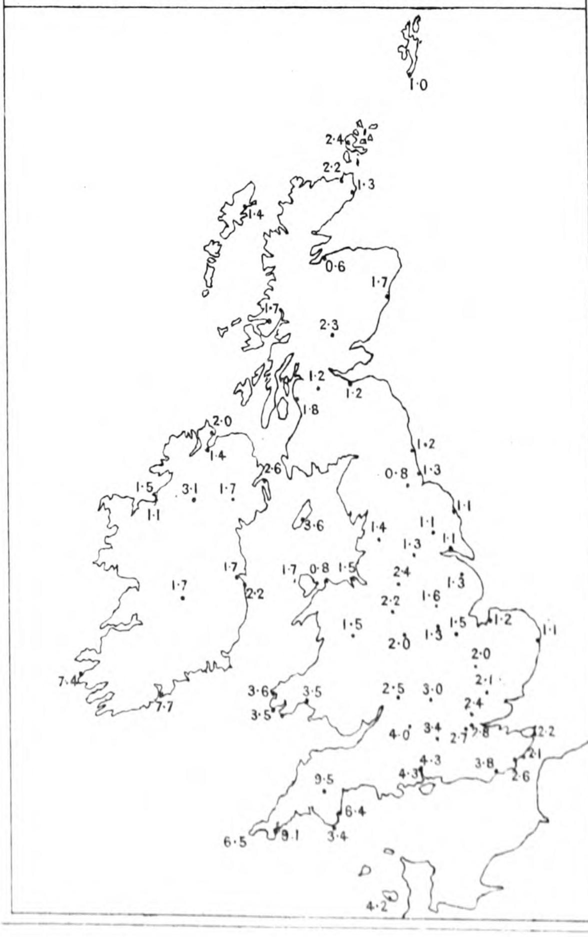
36°
37°
38°
39°
35°
40
41°
42°

4. RAINFALL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1·5
3·1
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3·6
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2·2
2·1
4·3
4·3
3·8
2·6
9·5
6·4
6·5
9·1
3·4
4·2

To follow Wind Chart for January.

Dangerfield Lith. 22, Bedford St. Covent Garden. 13626.

REMARKS FOR FEBRUARY 1879.

(*Tables A. to C., February, with Monthly Wind and Weather Charts.*)

Wind.—The wind during February was almost constantly varying between South-east and South-west, except at Ardrossan, where winds from East and North-east preponderated. The month commenced with South-easterly winds all over the kingdom, in consequence of the prevalence of a depression (No. XII.) over our south-western stations, while comparatively high barometric readings were reported in the north and north-east. On the 4th a change took place and the wind became Southerly, then South-westerly, and finally Westerly; by the 9th, however, South-easterly and Easterly breezes began to reappear in the north, and these winds (South-easterly in north and South-westerly to Westerly in south) remained over us, with but little interruption till the 21st. The wind then drew to the Northward of East until the 25th, when South-westerly breezes again began to appear at our extreme northern stations, and gradually spread Southwards over the country.

Pressure.—The mean barometrical pressure at 8 a.m. varied from about 29·55 inches over the southern half of England to a little below 29·45 inches over the Hebrides and extreme north-west of Ireland. The lowest points reached were considerably lower than those recorded in January, and occurred at all the observatories except Aberdeen during the complex cyclonic system which lay over us on the night of the 10th–11th. At Aberdeen the lowest reading occurred on the 6th. The highest readings (ranging from only 30·18 inches at Kew to 30·35 inches at Valencia) occurred mainly on the 26th in the band of high pressure which lay across our Islands at that time, but at Kew the highest reading registered on that occasion was exceeded by a reading recorded on February 1st, when the barometer was uniformly high over Germany, the North Sea, and the eastern parts of our Islands. The range was not large anywhere, the values varying from about 1·35 inch at Kew to 1·68 inch at Valencia.

Movements of the Depressions.—These were very singular. Two travelled in an easterly and north-easterly direction past our northern coasts, and along the west coast of Norway, while of those which appeared off the west and south-west of Ireland, one made a very singular track to the eastward, halting in its passage across England, and, after moving temporarily to the southward, continuing its journey over the North Sea to the Baltic, and three others moved south-eastwards across the mouth of the Channel to France. Of the last-named two dispersed over or close to the western coast of France, but the other was traced distinctly to the Mediterranean between Corsica and the Italian coast. One other depression (No. XVIII.) deserves notice, for although its centre was never very near to our Islands its influence on our winds was very great; the gales and strong North-easterly breezes felt at our eastern and southern stations on the 26th being entirely owing to the somewhat steep gradients found on its north-western side.

Temperature.—The mean (sea-level) temperature for the month ranged from a little above 44° on our extreme south-west coasts, to between 38° and 39° over the north of Ireland, to about 36° over our north-eastern counties, and to rather below 34° over central Scotland. In the extreme south-west, therefore, the values were about their mean height for the corresponding time of year in the 13 years 1857–69; but there was a deficit of about 3° over the north of Ireland, 4° over the north-eastern parts of England, and 5° or 6° over Scotland. The minimum readings occurred between the 23rd and 26th in most places, and, so far as the observatories are concerned, ranged in value from 20°·8 at Kew to

31°·2 at Valencia. At Aberdeen, however, the cold South-easterly wind and temporary anticyclonic condition of the 20th produced a minimum of 18° at 8 a.m. of that day, but at many of the inland stations of the Second Order readings of much lower value were recorded, *e.g.*, 11°·8 at Glenalmond, 12°·4 at Cheltenham, and 13°·8 at Buxton. The maxima occurred on very varying dates in different parts of the country. Thus in the extreme northern districts of Great Britain and Ireland the highest readings occurred on the 27th, but at Kew, Stonyhurst, and Valencia they were recorded on the 9th, and at Falmouth and Glasgow on the 6th or 7th. The range of temperature at the observatories varied from 31°·7 at Kew, and 30°·3 at Aberdeen to 20°·6 at Valencia; at Cheltenham it was 42°, while at Scilly it was only 18°.

Vapour Tension was highest (0·21 inch to 0·27 inch) over our south and south-west coasts, lowest 0·16 inch to 0·20 inch in the north and north-east, and over the Midland Counties; but *Relative Humidity* was, with some exceptions, highest inland and lowest at the coast stations.

Rainfall was heavy, more especially over the southern and many of the western districts, where the falls consisted largely of the snow and hail which accompanied the Easterly winds and gales so frequent during the month; in the north and north-west, however, there was a deficiency of downfall generally.

TABLE A., FEBRUARY.—SHOWING the MEAN and EXTREME PRESSURES and TEMPERATURES recorded at each of the SEVEN SELF-RECORDING OBSERVATORIES of the METEOROLOGICAL OFFICE during the Month of FEBRUARY 1879; together with the EXTREME RANGE of each, the MONTHLY VAPOUR TENSION, the RELATIVE HUMIDITY, and TOTAL RAINFALL.

NAMES OF OBSERVATORIES.	PRESSURE at 32° F. and the Mean Sea Level (In English Inches).						TEMPERATURE In the Shade (In Degrees Fahrenheit).						HYGROMETRIC VALUES.		RAINFALL (In English Inches).
	Mean for the Month.	Extremes.				Range.	Mean for the Month.	Extremes.				Range.	Tension of Vapour (In English Inches).	Relative Humidity (Saturation = 100).	
		Minimum.		Maximum.				Minimum.		Maximum.					
		Reading.	Date.	Reading.	Date.			Reading.	Date.	Reading.	Date.				
	ins.	ins.	D. H.	ins.	D. H.	ins.	°	°	D. H.	°	D. H.	°	in.	%	ins.
Valencia - -	29·485	28·663	11th, 1 a.m.	30·347	26th, 11 a.m.	1·684	43·6	31·2	26th, 5 a.m.	51·8	9th, 1 p.m.	20·6	0·240	84	6·994
Armagh - -	·499	·835	10th, 3 p.m.	·315	25th, Midt. 26th, 3 a.m.	1·480	38·0	26·9	25th, 8 a.m.	49·5*	27th, ?	22·6	·204	89	1·570
Glasgow - -	·502	·856	10th, 9 p.m.	·272	25th, 9 p.m.	1·416	35·0	23·4	26th, 7 a.m.	47·2	7th, Noon	23·8	·180	88	1·695
Aberdeen - -	·533	·824	5th, 2 p.m.	·282	25th, 8 p.m. 9 p.m.	1·458	34·8	18·0	20th, 8 a.m.	48·3	27th, Noon 1 p.m.	30·3	·168	83	2·055
Falmouth - -	·545	·806	1 th, 11 a.m.	·286	26th, 8 p.m. 9 p.m.	1·480	43·2	28·5	25th, 7 a.m.	52·3	6th, 2 p.m.	23·8	·245	87	5·265
Stonyhurst - -	·516	·791	10th, 6 p.m. 7 p.m.	·220	26th, 11 a.m.	1·429	35·9	25·2	23rd, 5 a.m.	48·9	9th, 1 p.m.	23·7	·181	86	2·600
Kew - -	29·547	28·834	10th, 6 p.m.	30·182	1st, 1 a.m.	1·348	38·7	20·8*	24th, ?	52·5	9th, 1 p.m.	31·7	·208	88	4·130

* Corrected reading of ordinary self-registering thermometer obtained from Weather Register, curve having failed.

TABLE B., FEBRUARY.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at
The values are not
(The Stations are grouped in Districts, and then arranged in order of Latitude,

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 9 a.m. and 9 p.m.	AIR TEMPERATURE.									
						Means of			Absolute Extremes.			
			At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.
		ins.	°	°	°	°	°	°	°		°	
0. SCOTLAND, N. -	Orkneys (Sandwick Manse) -	29·503	35·1	35·0	35·1	31·7	39·5	35·6	24·3	19th	47·7	27th
1. SCOTLAND, E. -	Glenalmond - - -	29·539	30·9	31·6	31·3	26·5	36·3	31·4	11·8	26th	48·0	7th
2. ENGLAND, N.E. -	Seaham - - -	29·520	36·4	36·0	36·2	32·0	39·6	35·8	23·8	22nd	50·0	27th
	Durham* - - -	29·518	34·7	33·5	34·1	29·9	38·8	34·4	17·4	22nd	46·2	27th
	Hull - - - -	29·540	36·3	36·0	36·2	32·8	42·1	37·5	27·5	22nd	54·1	9th
	Kelstern 𝔐 - - -	29·541	34·6	33·2	33·9	30·1	38·5	34·3	18·1	24th	52·4	9th
3. ENGLAND, E. -	Hillington 𝔐 - - -	29·528	36·8	35·5	36·2	32·0	40·8	36·4	20·5	24th	54·9	9th
	Audley End (Saffron Walden) 𝔐	29·522	37·0	37·3	37·2	33·4	41·6	37·5	20·0	24th	53·6	9th
	Chigwell Row - -	29·574	37·4	38·1	37·8	34·4	42·0	38·2	25·0	24th	52·0	9th
4. MIDLAND COUNTIES.	Wakefield 𝔐 - - -	29·533	36·2	36·1	36·2	32·7	40·2	36·5	24·7	25th	53·1	9th
	Buxton 𝔐 - - -	29·553	34·2	32·6	33·4	28·6	37·3	33·0	13·8	22nd	47·1	10th
	Cheadle 𝔐 - - -	29·529	34·3	34·2	34·3	31·0	39·0	35·0	21·9	24th	53·0	9th
	Leicester - - -	29·531	36·7	37·1	36·9	33·9	41·5	37·7	23·6	24th	54·8	9th
	Uppingham - - -	29·539	34·9	35·3	35·1	32·2	40·5	36·4	19·8	24th	53·0	9th
	Oscott - - - -	29·531	35·5	35·5	35·5	31·9	40·8	36·4	20·9	25th	54·0	9th
	Churchstoke 𝔐 - -	29·541	36·2	36·4	36·3	31·9	42·0	37·0	20·3	25th	52·4	9th
	Cheltenham 𝔐 - -	29·534	38·0	37·5	37·8	32·6	42·8	37·7	12·4	25th	54·8	9th
5. ENGLAND, S. -	Marlborough 𝔐 - -	29·557	36·0	36·7	36·4	32·8	43·4	38·1	20·9	22nd	52·7	9th
	Strathfield Turgiss 𝔐 -	29·554	37·7	37·7	37·7	33·0	43·4	38·2	16·6	24th	52·1	8th, 9th
	Ramsgate 𝔐 - - -	29·582	37·8	38·5	38·2	34·7	42·7	38·7	26·9	1st	52·6	8th
	Folkestone - - -	29·553	37·5	38·1	37·8	34·2	41·9	38·1	26·9	1st	47·4	10th
	Southampton - - -	29·549	38·1	39·0	38·6	35·9	42·7	39·3	25·7	24th	50·2	8th
	Hastings - - -	29·561	37·7	38·1	37·9	34·9	41·4	38·2	27·2	24th	48·0	9th
6. SCOTLAND, W. -	Laudale - - -	29·475	36·3	36·9	36·6	31·4	41·2	36·3	26·8	20th	48·2	8th
7. ENGLAND, N.W. -	Douglas (Isle of Man) -	29·491	38·0	36·7	37·4	32·9	41·5	37·2	27·4	22nd	48·9	6th, 7th
	Llandudno 𝔐 - - -	29·503	39·2	38·5	38·9	35·2	43·1	39·2	28·2	1st	50·8	10th
8. ENGLAND, S.W. -	St. David's - - -	29·496	40·4	40·2	40·3	36·8	44·6	40·7	26·9	25th	51·0	11th
	Caermarthen 𝔐 - -	29·514	40·0	38·9	39·5	34·7	45·7	40·2	24·2	25th	52·2	11th
	Dartmoor 𝔐 - - -	29·539	36·5	36·1	36·3	32·2	40·4	36·3	20·7	25th	48·0	14th
	Babbacombe 𝔐 - -	29·541	41·0	40·3	40·7	36·8	46·7	41·8	28·2	25th	53·9	6th
9. IRELAND, N.	Londonderry - - -	29·493	37·5	37·4	37·5	34·2	1·6	37·9	27·5	25th	49·2	27th
	Brookeborough - -	29·430	36·1	36·9	36·5	32·8	42·4	37·6	21·8	5th, 26th	49·1	27th
	Markree Castl - -	—	37·4	37·3	37·4	32·6	43·9	38·3	22·2	25th	51·6	27th
10. IRELAND, S. -	Dublin - - - -	29·501	39·2	40·0	39·6	36·5	43·7	40·1	27·9	26th	51·3	6th
	Parsonstown - - -	29·498	38·2	38·1	38·2	33·9	45·1	39·5	25·0	25th	53·8	5th
CHANNEL - -	Jersey (St. Aubin's) - -	29·609	42·6	42·2	42·4	38·5	46·9	42·7	30·4	24th	52·8	8th

NOTE.—The stations marked thus 𝔐 are in connection with the Royal Meteorological Society.
* At Durham the observations were taken at 10 a.m. and 10 p.m. each day.

STATIONS of the SECOND ORDER in the BRITISH ISLANDS, during the Month of FEBRUARY 1879.
corrected for Diurnal Range.
beginning in each case with the Station lying furthest North.)

TENSION OF VAPOUR.			RELATIVE HUMIDITY.			AMOUNT OF CLOUD (0 to 10).			RAINFALL.			WEATHER. No. of Days of							WIND. No. of Observations of								
At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
in.	in.	in.	%	%	%				ins.	ins.																	
·189	·186	·188	92	91	92	5·5	6·8	6·2	1·250	·210	16th, 26th	21	5	0	0	5	11	3	5	3	6	13	7	7	2	2	11
·160	·161	·161	91	89	90	8·7	7·0	7·9	4·895	1·730	16th	15	13	0	0	0	18	0	1	2	10	6	3	4	13	1	10
·200	·195	·198	93	92	93	9·3	7·8	8·6	3·100	·340	15th	27	15	1	0	0	18	1	8	3	7	12	9	7	2	3	5
·188	·176	·182	93	90	92	9·5	7·5	8·5	2·345	·270	23rd	22	13	1	0	0	20	0	5	5	10	7	10	5	2	10	2
·203	·199	·201	95	94	95	9·3	8·3	8·8	3·207	·490	8th	25	11	0	0	0	22	0	5	7	9	10	2	12	3	3	5
·188	·185	·187	92	95	94	8·8	7·4	8·1	3·067	·660	8th	23	11	2	0	1	19	0	8	5	7	9	8	6	5	7	1
·203	·195	·199	91	92	91	8·6	7·9	8·3	2·271	·454	8th	19	14	1	0	0	16	0	2	10	3	12	9	11	2	7	0
·202	·205	·204	90	90	90	8·5	8·0	8·3	3·320	·720	10th	26	14	1	0	1	21	0	1	10	2	11	0	15	3	14	0
·210	·215	·213	94	94	94	8·3	9·0	8·7	2·980	·740	10th	20	10	0	0	1	18	0	6	10	6	4	2	14	5	5	4
·199	·197	·198	92	91	92	9·2	8·5	8·9	2·500	·500	8th	21	7	0	0	0	20	1	8	6	10	7	4	6	8	6	1
·181	·166	·174	90	87	88	9·6	8·1	8·9	4·730	·670	7th	21	11	2	0	0	19	0	5	6	9	8	0	7	6	12	3
·187	·186	·187	94	94	94	9·5	7·3	8·4	4·090	·720	8th	20	10	0	0	0	18	5	9	3	10	3	6	9	4	9	3
·198	·201	·200	91	91	91	9·6	8·6	9·1	1·960	·300	8th	22	10	1	0	0	24	0	2	9	4	10	0	19	4	4	4
·197	·196	·197	95	93	94	9·4	8·9	9·2	1·832	·305	8th	20	9	0	0	0	23	0	7	5	3	7	5	12	7	4	6
·197	·199	·198	92	93	93	9·5	8·1	8·8	2·640	·370	1st	22	13	1	0	0	21	1	7	7	9	5	8	6	9	3	2
·196	·201	·199	90	92	91	8·0	8·0	8·0	2·740	·390	8th	18	9	2	0	0	14	0	5	5	11	4	6	6	14	5	0
·211	·209	·210	90	91	90	8·7	6·5	7·6	2·700	·380	13th	23	9	0	0	2	15	0	5	2	3	15	6	9	1	13	2
·203	·209	·206	93	93	93	8·9	7·9	8·4	4·743	·650	8th	23	7	1	0	0	21	0	4	3	2	3	1	11	4	2	26
·202	·206	·204	85	87	86	8·5	7·8	8·2	3·207	·407	8th	24	9	2	0	2	19	0	8	4	2	7	5	15	6	6	3
·211	·217	·214	91	91	91	9·1	8·8	9·0	3·220	·430	16th	23	8	4	0	0	19	2	5	15	2	2	7	13	4	1	7
·205	·213	·209	90	92	91	8·5	8·6	8·6	3·890	·400	15th	24	9	3	0	1	18	1	9	5	9	1	9	12	9	1	1
·216	·228	·222	91	93	92	7·9	7·7	7·8	4·144	·518	8th	23	8	1	0	1	17	1	7	6	4	10	3	16	4	4	2
·211	·216	·214	91	93	93	8·1	7·9	8·0	3·795	·610	9th	22	8	4	0	2	19	1	7	11	2	1	12	11	6	4	2
·180	·185	·183	82	84	83	6·1	4·9	5·5	3·780	1·290	5th	12	15	0	0	6	9	2	2	5	20	4	5	7	1	0	12
·206	·201	·204	89	91	90	8·3	6·3	7·3	4·376	·890	15th	20	8	3	0	0	13	1	3	3	14	3	2	5	5	2	19
·205	·203	·204	84	87	86	7·8	7·4	7·6	3·192	·780	15th	16	7	1	0	0	12	2	2	7	6	11	5	5	16	4	0
·229	·231	·230	90	91	90	8·0	6·6	7·3	4·970	·650	8th	25	6	5	1	0	14	1	7	10	10	6	3	12	5	2	1
·231	·225	·228	92	93	92	7·4	7·3	7·4	4·940	·890	8th	22	4	5	1	1	14	0	10	1	7	8	3	9	5	3	10
·214	·210	·212	96	97	96	8·7	7·8	8·3	10·320	1·700	8th	28	11	2	0	0	21	0	3	7	3	6	3	7	8	9	10
·234	·232	·233	89	91	90	7·4	7·4	7·4	5·490	·930	1st	25	10	5	0	0	13	0	8	6	6	3	6	15	6	4	2
·209	·208	·209	92	92	92	7·9	5·7	6·8	1·750	·350	2nd	19	4	1	0	2	12	0	2	6	7	5	5	9	8	0	14
·196	·201	·199	92	92	92	8·9	6·4	7·7	2·501	·379	5th	17	†	†	†	2	16	3	2	13	6	4	1	4	3	2	21
·206	·206	·206	91	91	91	8·2	8·0	8·1	1·855	·424	15th	26	5	2	0	1	19	0	4	6	4	8	8	8	1	1	16
·217	·218	·218	89	87	88	7·8	7·7	7·8	3·706	·940	8th	23	5	6	0	0	13	0	3	4	9	8	4	3	16	6	3
·219	·214	·217	93	92	92	7·2	6·3	6·8	3·289	·488	8th	24	4	0	0	2	10	0	5	4	1	7	9	11	4	5	10
·242	·241	·242	87	88	88	8·3	8·3	8·3	5·051	·730	9th	26	2	10	1	0	18	0	4	10	1	4	9	12	8	6	2

† No observations.

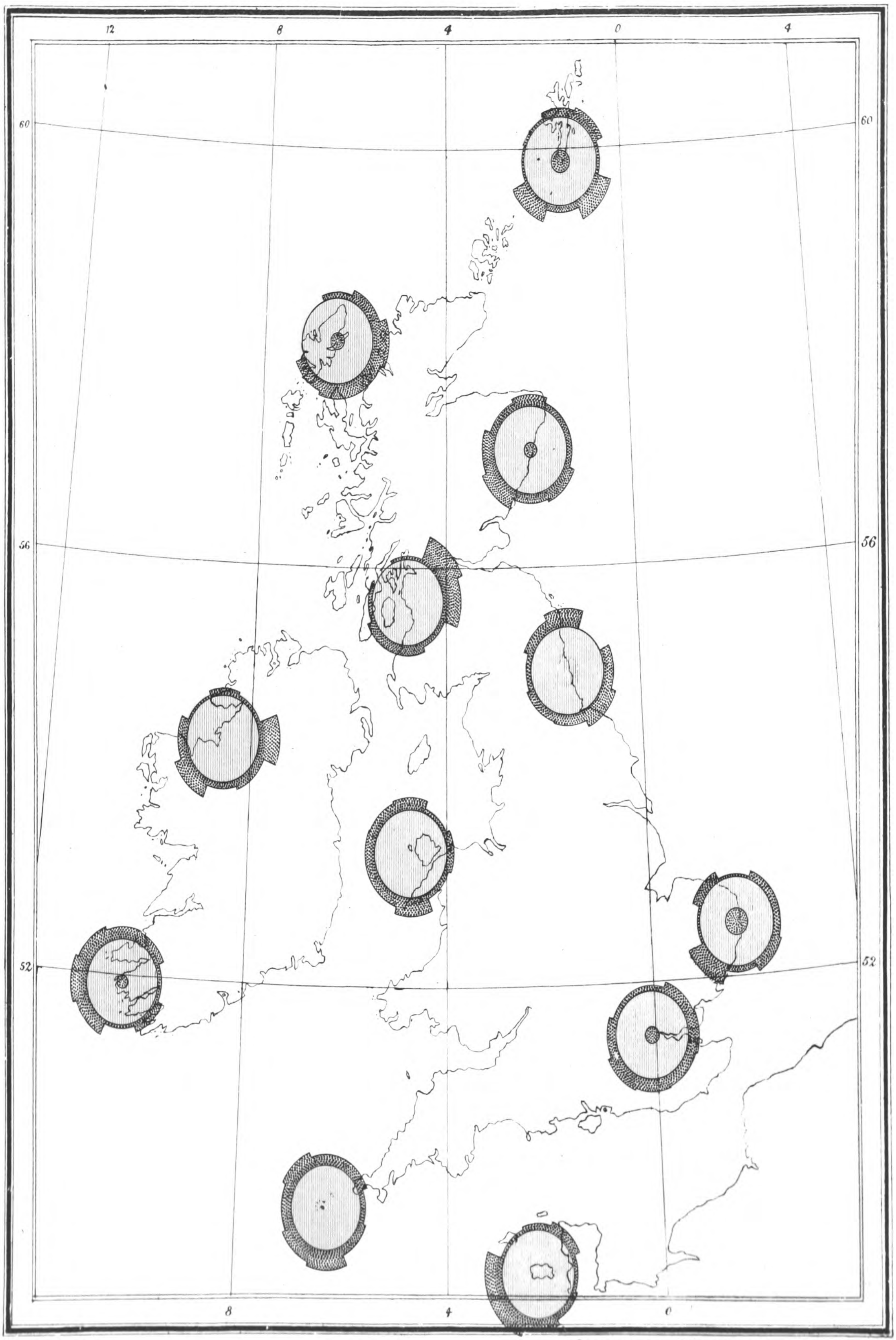
TABLE C., FEBRUARY.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at TELEGRAPHIC REPORTING STATIONS in the BRITISH ISLANDS, during the Month of FEBRUARY 1879. Observations are made at 8 a.m. daily.

(The Stations are grouped in Districts, and then arranged in order of Latitude, beginning in each case with the Station lying furthest North.)

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 8 a.m.	AIR TEMPERATURE.								TENSION OF VAPOUR.	RELATIVE HUMIDITY.	AMOUNT OF CLOUD.	RAINFALL.			WEATHER. No. of Days of							WIND. No. of Observations of								
			Means of				Absolute Extremes.																									
			At 8 a.m.	Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.				Total Fall in the Month.	Maximum Fall in One Day.	Date,	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
		ins.	°	°	°	°	°		°		in.	%		ins.	ins.																	
0. SCOTLAND, N.	Sumburgh Head	29·520	35·7	31·6	39·7	35·7	22	19th	47	27th	·183	87	6·7	0·88	0·24	26th	16	4	0	0	5	9	0	3	4	1	6	2	7	1	1	3
	Thurso	29·509	32·9	28·8	40·1	34·5	11	19th	49	27th	·179	96	7·1	1·55	0·56	16th	16	6	0	0	5	16	0	1	2	3	6	6	1	0	0	9
	Wick	29·502	35·0	29·7	41·5	35·6	16	19th	49	7th	·178	87	6·7	0·80	0·22	26th	11	1	0	0	7	14	3	0	2	1	5	8	4	0	3	5
	Stornoway	29·426	36·7	33·0	40·4	36·7	25	22nd	48	27th	·202	93	5·8	1·41	0·23	25th	13	1	0	0	8	8	10	2	3	8	5	5	3	0	0	2
1. SCOTLAND, E.	Nairn	29·492	33·1	29·8	38·9	34·4	20	23rd	50	27th	·158	84	5·6	0·48	0·12	24th	10	4	0	0	5	7	0	0	1	2	5	1	6	2	0	11
	Aberdeen	29·524	32·9	29·4	38·6	34·0	18	20th, 21st	47	27th	·160	86	6·0	2·26	0·89	16th	18	13	1	0	9	10	2	3	2	2	4	3	6	5	2	1
	Leith	29·488	34·7	30·8	40·5	35·7	22	20th	52	7th	·184	91	8·0	1·47	0·58	16th	19	7	1	0	0	15	0	1	1	6	6	2	2	7	0	3
2. ENGLAND, N.E.	Shields	29·520	35·4	32·9	39·1	36·0	25	22nd	48	6th	·192	92	8·7	2·94	0·45	16th	26	15	3	0	3	23	4	6	0	4	6	4	3	2	3	0
	Scarborough	29·522	35·9	33·8	38·9	36·4	28	22nd, 24th	50	9th	·208	94	8·8	3·19	0·47	16th	25	5	4	0	1	20	1	3	3	4	5	4	5	3	1	0
	York	29·522	35·3	32·1	40·0	36·1	25	25th	52	9th	·195	94	8·4	2·62	0·42	15th	23	5	0	0	1	7	0	5	3	4	4	7	1	2	2	0
3. ENGLAND, E.	Yarmouth	29·538	36·3	32·8	39·7	36·3	26	2nd	53	9th	·201	94	8·1	2·74	0·47	16th	24	13	3	0	1	19	1	1	3	3	4	2	6	1	3	5
	Cambridge	29·540	35·9	32·5	43·6	38·1	22	24th, 25th	58	9th	·202	96	8·9	2·71	0·55	10th	23	7	1	1	2	22	0	5	0	3	4	4	6	2	3	1
4. MIDLAND COUNTIES.	Nottingham	29·535	35·9	32·2	42·1	37·2	22	24th	54	9th	·198	94	9·9	2·60	0·57	8th	22	10	0	0	0	27	0	3	2	1	4	4	5	0	1	8
	Oxford	29·544	36·3	33·8	42·9	38·4	23	24th, 25th	52	7th, 8th	·199	93	8·3	3·46	0·43	7th	22	8	2	0	3	20	0	4	0	2	1	5	4	7	1	4
5. ENGLAND, S.	London	29·545	36·8	33·7	43·3	38·5	22	24th, 25th	53	8th, 9th	·203	91	8·5	4·19	0·78	10th	25	11	0	0	1	21	1	2	3	4	3	4	5	3	2	2
	Dover	29·544	37·4	34·8	41·5	38·2	28	1st	47	8th, 9th 10th	·204	91	6·4	4·37	0·54	16th	24	4	3	0	4	8	1	1	5	5	0	2	7	6	2	0
	Hurst Castle	29·547	38·5	36·0	43·5	39·8	28	24th	49	9th	·215	93	6·9	3·90	0·47	19th	24	4	0	0	5	11	3	3	4	3	2	5	4	4	3	0
6. SCOTLAND, W.	Ardrossan	29·481	34·5	32·0	40·9	36·5	24	20th	50	6th	·174	85	8·5	2·04	0·28	13th	20	8	0	0	1	20	2	1	11	7	1	3	4	1	0	0
7. ENGLAND, N.W.	Liverpool	29·497	36·5	33·8	41·1	37·5	27	2nd	52	9th	·195	91	8·3	2·63	0·43	7th	18	3	0	0	3	19	0	3	2	5	5	1	3	5	4	0
	Holyhead	29·476	39·0	36·3	42·9	39·6	30	1st	49	9th	·216	91	7·8	4·36	0·74	1st	22	4	1	0	2	9	0	4	1	4	2	6	4	4	3	0
8. ENGLAND, S.W.	Pembroke	29·488	40·2	36·5	44·0	40·3	28	1st, 25th	49	14th	·220	89	7·1	4·27	0·65	1st	22	3	2	0	4	12	5	3	3	4	4	3	3	3	5	0
	Prawle Point	29·550	39·6	36·9	46·4	41·7	28	23rd, 24th	51	14th, 27th	·227	93	6·8	2·95	0·48	10th	22	0	0	0	5	11	1	3	4	1	3	5	3	5	4	0
9. IRELAND, N.	Greencastle	29·451	37·7	33·7	43·6	38·7	27	25th	49	6th	·204	90	9·1	1·68	0·33	9th	20	3	0	0	1	23	0	4	2	5	2	7	3	4	1	0
	Donaghadee	29·486	37·2	33·8	41·6	37·7	29	25th, 26th	49	7th	·214	96	5·9	2·31	0·30	9th, 15th	21	0	0	0	6	9	4	2	2	6	5	2	7	4	0	0
	Mullaghmore	29·449	38·6	36·1	43·3	39·7	29	26th	51	27th	·213	91	9·0	2·78	0·66	15th	22	3	2	0	0	19	5	2	1	9	3	2	7	3	1	0
10. IRELAND, S.	Kingstown	29·482	39·7	36·5	43·6	40·1	30	20th, 25th	53	27th	·216	88	7·9	3·86	1·02	1st	23	2	0	0	3	15	2	1	1	4	4	3	3	8	4	0
	Valencia	29·493	42·6	38·1	49·0	43·6	29	26th	53	5th	·238	87	7·6	6·73	0·54	9th	25	1	5	1	2	13	6	4	3	1	4	1	3	6	5	1
	Roche's Point	29·486	41·7	38·7	47·1	42·9	32	23rd	53	7th	·230	88	5·8	6·87	1·08	1st	24	3	3	0	7	9	4	3	4	2	2	2	3	9	3	0
CHANNEL ISLANDS.	Scilly	29·528	45·7	42·5	48·6	45·6	35	25th, 26th	53	7th, 13th	·272	89	8·7	4·70	0·48	6th	27	1	5	0	0	17	13	3	3	1	2	6	5	3	5	0
	Jersey	29·536	41·4	40·7	45·2	43·0	31	24th, 25th	51	7th	·238	91	7·6	4·62	0·64	9th	26	1	9	1	1	11	5	2	4	1	2	4	7	7	1	0

MONTHLY WIND CHART. FEBRUARY 1879.

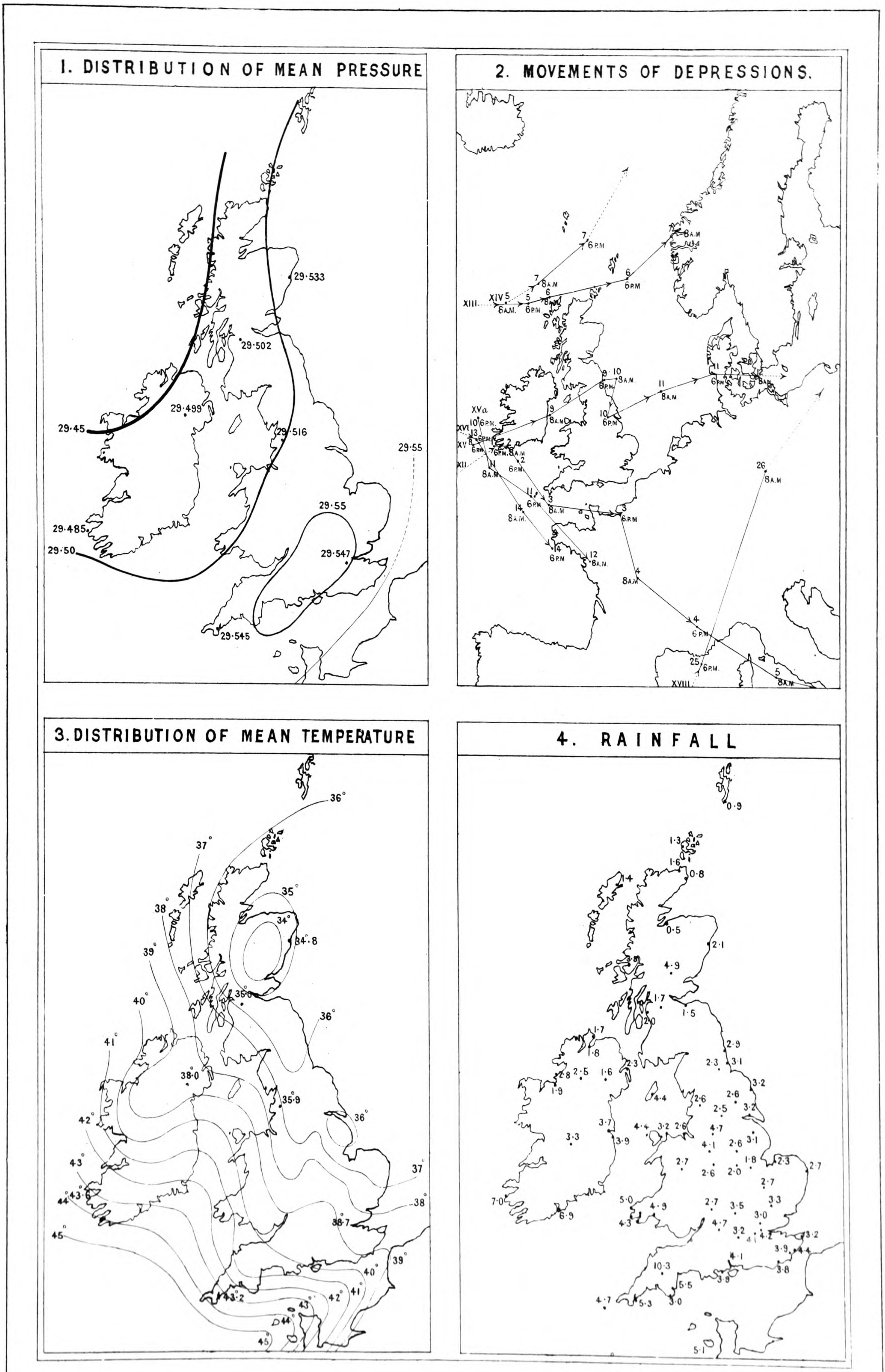
Showing the Relative Prevalence of Wind for 8 points.


12
8
4
0
4
60
60
56
56
52
52
8
4
0

To face p. 38.

DANGERFIELD, LITH. 22, BEDFORD ST. COVENT GARDEN. 13626.

MONTHLY WEATHER CHART. FEBRUARY 1879.



1. DISTRIBUTION OF MEAN PRESSURE

29·533
29·502
29·499
29·45
29·516
29·55
29·485
29·50
29·55
29·547
29·545

2. MOVEMENTS OF DEPRESSIONS.

XIII
XIV
XVa
XVI
XV
XII
XVIII
8A.M.
6P.M.

3. DISTRIBUTION OF MEAN TEMPERATURE

36°
37°
35°
38°
34°
34·8
39°
35·0
40°
36°
41°
38·0
35·9
42°
36°
43°
37°
43·5
44°
38°
38·7
45°
39°
40°
43·2
43
42°
41
44
45

4. RAINFALL

0·9
1·3
1·6
0·8
1·4
0·5
2·1
3·8
4·9
1·7
1·5
2·0
1·7
1·8
2·9
2·3
3·1
2·8
2·5
1·6
2·3
1·9
3·2
4·4
2·6
2·6
3·2
2·5
3·7
4·4
3·2
2·6
4·7
3·3
3·9
4·1
2·6
3·1
2·7
1·8
2·3
2·7
2·6
2·0
2·7
7·0
5·0
4·9
2·7
3·5
3·3
3·0
6·9
4·3
4·7
3·2
4·1
4·2
3·2
3·9
4·4
10·3
4·1
3·8
3·9
5·5
4·7
5·3
3·0
5·1

To follow Wind Chart for February.

DANGERFIELD LITH. 22, BEDFORD ST. COVENT GARDEN. 13626

REMARKS FOR MARCH 1879.

(*Tables A. to C., March, with Monthly Wind and Weather Charts.*)

Wind.—During the month of March South-westerly and Easterly currents of wind prevailed alternately over the United Kingdom, but the former preponderated. The latter had some little Southing in it at the more northern stations, but some Northing in the south. Both currents occasionally blew very strongly (as will be seen by referring to the table of cyclonic systems and the anemograph records on Plates XIII. to XVIII.), and at times the two currents prevailed simultaneously over different parts of the kingdom.

The month commenced with light airs, which quickly gave way to a wind from West and South-west. This current appeared first of all on our extreme northern coasts, and, increasing in strength, spread southwards till it covered the whole of our Islands. On the 11th the wind began to veer Northwards, and by the night of the 13th an anticyclone of somewhat unusual form had appeared over the British Isles, while strong Northerly and North-westerly winds prevailed over and to the eastward of the North Sea. On the 15th an elongated low-pressure system appeared over us, and for a time strong Easterly winds were felt over our northern districts, while strong South-westerly to Westerly winds were blowing in the south. The wind then lulled generally, and an Easterly breeze gradually spread over the country (on the 19th), blew strongly, and remained with us till the 27th. Pressure then rose over southern Europe, and the wind drew round to between the South and West, and continued in that quarter till the close of the period.

Pressure.—Pressure was on the whole highest over England, especially over the south-western counties, lowest to the north-westward of our Islands, the mean (sea-level) readings for the month ranging from about 30 inches over Devon, Dorset, Monmouth, and Worcestershire to a little below 29·8 inches over the Hebrides, the gradients being almost nil over England and Wales, but more decided over Scotland and the north of Ireland. The lowest readings observed occurred during the passage of the depressions (Nos. XXV. and XXVI.) of the 27th and 29th, except at Aberdeen, where the lowest reading occurred on the 4th, when a well-formed depression passed east-north-eastwards over Scotland in its journey towards northern Europe. In this respect Aberdeen is typical of all the northern part of Scotland, where apparently this depression gave lower values than any others experienced during the month. None of our observatories, however, record a sea-level value lower than 29·178 inches, and at Kew the lowest point reached was 29·566 inches. The highest readings ranged from 30·633 inches at Kew to 30·461 inches at Aberdeen and occurred everywhere between the 7th and 9th, during which time an anticyclone lay over France and England. The range of pressure for the month was small, amounting to very little more than an inch at Kew, and to 1·387 inches at Armagh only.

Movements of Depressions.—These were very decided at the beginning and again at the close of the month, but during the middle portion the depressions observed were slight, and their movements slow and irregular. Between the 1st and the 10th the centres of all the disturbances passed in a north-easterly or east-north-easterly direction outside our north-western and northern coasts, producing strong South-westerly winds or gales at our western and northern stations with rain, the weather being on the whole mild for the time of year. A change then took place. One depression passed with great rapidity over Scotland and the North Sea on the 12th, and after some comparatively shallow disturbances between the 14th and 17th, pressure became permanently high over northern and low over southern Europe, the only depression observed being stationary over France. On the 26th, however, a well-formed cyclone appeared off our south-west coasts, and passing eastwards over France, caused Easterly gales in our Islands, and then dispersed. The barometer then rose over the Peninsula, and the two last depressions (XXVI. and XXVII.) experienced during the month moved north-north-eastward up our western coasts.

Temperature.—The mean (sea-level) temperature of the month varied from 45° to 46° on our extreme south-western coasts to about 39° over the most northern parts of England and Ireland, to a little below 37° over central Scotland, and to 36° at the southern point of the Shetlands. These values are below the average for the corresponding month in the 13 years 1857–1869 by about 2° in Scotland and the north of Ireland, and by about 1° over England, but in the extreme south of Ireland the difference was slight, and in the opposite direction. The lowest readings were recorded at nearly all our northern and north-western stations on the 13th or 14th, when an anticyclone lay over the United Kingdom, between the 25th and 27th on our south-west coasts, when cold Easterly winds swept over all our southern and south-western districts, and on the 2nd at Kew, when an anticyclone No. VIII. lay over France and our southern districts. The maximum readings, on the contrary, were recorded at various dates—viz., on the 19th or 20th over England (when the wind was light from the Eastward), on the 7th or 8th in Ireland (when anticyclonic Westerly to Southerly breezes were felt over all the western and northern parts of the kingdom), on the 4th at Aberdeen and 29th at Glasgow. The maximum values were much higher over the inland parts of England than elsewhere, and, as the minima there were low the range was large—amounting to about 37° at Strathfield Turgiss and Kew, against 29°·8 at Glasgow, and little more than 23°·5 at Valencia and Falmouth.

Vapour Tension was greatest, 0·22 inch to 0·24 inch, on our south-west coasts, least 0·17 inch to 0·21 inch over Scotland, but the *Relative Humidity* was irregularly distributed between 83 and 94 per cent.

Rainfall.—The fall of rain was very slight over England and the eastern half of Ireland, but heavier in the west of Ireland, and decidedly heavier in Scotland—where the Westerly winds which prevailed at the earlier and latter parts of the month brought rain, and the Easterly winds about the middle brought snow. Thus, while the number of days with rain varied from 17 to 24 in Ireland and Scotland, they varied from only 9 to 14 on our south-east and north-east coasts.

TABLE A., MARCH.—SHOWING the MEAN and EXTREME PRESSURES and TEMPERATURES recorded at each of the SEVEN SELF-RECORDING OBSERVATORIES of the METEOROLOGICAL OFFICE during the Month of MARCH 1879; together with the EXTREME RANGE of each, the MONTHLY VAPOUR TENSION, the RELATIVE HUMIDITY, and TOTAL RAINFALL.

NAMES OF OBSERVATORIES.	PRESSURE at 32° F. and the Mean Sea Level (In English Inches).						TEMPERATURE in the Shade (In Degrees Fahrenheit).						HYGROMETRIC VALUES.		RAINFALL (In English Inches).
	Mean for the Month.	Extremes.				Range.	Mean for the Month.	Extremes.				Range.	Tension of Vapour (In English Inches).	Relative Humidity (Saturation=100).	
		Minimum.		Maximum.				Minimum.		Maximum.					
		Reading.	Date.	Reading.	Date.			Reading.	Date.	Reading.	Date.				
Valencia - -	ins. 29·932	ins. 29·206	D. H. 28th, 6 p.m.	ins. 30·516	D. H. 7th, 11 a.m.	ins. 1·310	° 45·3	° 31·9	D. H. 27th, 7 a.m.	° 55·7	D. H. 7th, 3 p.m.	° 23·8	in. ·248	% 82	ins. 2·757
Armagh - -	·929	·178	28th, Midt.	·565	7th, 8 p.m.	1·387	40·0	28·5	13th, 7 a.m.	53·1	8th, 2 p.m.	24·6	·211	86	2·000
Glasgow - -	·901	·202	29th, 4 a.m.	·526	7th, 11 p.m. 8th, 1 a.m. 2 a.m.	1·324	37·8	21·3	14th, 7 a.m.	51·1	29th, 2 p.m.	29·8	·189	83	3·848
Aberdeen - -	·917	·274	4th, 2 p.m.	·461	8th, 1 a.m.	1·187	37·5	26·1	13th, 5 a.m.	51·7	4th, 4 p.m.	25·6	·176	78	2·355
Falmouth - -	·992	·405	27th, 2 a.m. 3 a.m.	·559	9th, Midt.	1·154	43·9	32·0	25th, 3 a.m.	55·6	20th, 3 p.m.	23·6	·237	82	1·640
Stonyhurst - -	·959	·397	29th, 4 a.m.	·619	8th, 2 a.m.	1·222	39·1	26·9	13th, 7 a.m.	54·4	19th, 2 p.m. 3 p.m.	27·5	·191	80	2·467
Kew - -	29·991*	29·566	27th, 4 p.m.	30·633	8th, 7 a.m.	1·067	41·3	25·8	2nd, 7 a.m.	62·9	19th, 2 p.m.	37·1	·209	81	0·930

* Three of the daily means are approximate only.

TABLE B., MARCH.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at

The values are not

(The Stations are grouped in Districts, and then arranged in order of

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 9 a.m. and 9 p.m.	AIR TEMPERATURE.									
						Means of			Absolute Extremes.			
			At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.
		ins.	°	°	°	°	°	°	°		°	
0. SCOTLAND, N.	Orkneys (Sandwick Manse)	29·863	36·7	35·4	36·1	32·5	40·8	36·7	21·6	15th	50·0	8th
1. SCOTLAND, E.	Glenalmond	29·928	35·9	34·0	35·0	30·2	40·2	35·2	18·2	14th	51·0	12th
2. ENGLAND, N.E.	Seaham	29·940	40·6	38·0	39·3	34·1	46·2	40·2	19·8	14th	58·5	29th
	Durham*	29·944	40·7	36·1	38·4	32·6	45·1	38·9	15·5	14th	56·8	19th
	Hull	29·985	39·3	38·7	39·0	34·7	47·4	41·1	25·4	14th	58·3	10th
	Kelstern 𝔐	29·985	38·0	36·5	37·3	32·9	44·9	38·9	25·6	13th	58·8	9th
3. ENGLAND, E.	Hillington 𝔐	29·970	40·5	38·0	39·3	33·3	47·5	40·4	26·5	2nd	64·1	19th
	Audley End (Saffron Walden) 𝔐	29·985	40·0	38·6	39·3	33·2	48·0	40·6	26·0	8th	64·0	19th
	Chigwell Row	30·024	40·3	40·2	40·3	35·1	47·8	41·5	29·0	13th	62·0	19th
4. MIDLAND COUNTIES.	Wakefield 𝔐	29·971	39·5	39·0	39·3	34·4	46·2	40·3	24·6	13th	56·3	8th
	Buxton 𝔐	30·008	37·2	36·3	36·8	31·5	43·7	37·6	24·0	13th	56·4	9th
	Cheadle 𝔐	29·983	37·6	37·2	37·4	32·6	45·3	39·0	24·9	13th	56·6	19th
	Leicester	29·982	39·7	39·8	39·8	34·5	47·3	40·9	26·6	8th	61·0	19th
	Uppingham	29·985	38·5	37·5	38·0	33·5	46·0	39·8	26·5	13th	61·2	19th
	Oscott	29·984	38·5	38·3	38·4	33·5	47·7	40·6	25·6	13th	59·0	19th
	Churchstoke 𝔐	30·000	39·1	38·7	38·9	33·2	46·2	39·7	22·3	13th	56·4	7th
	Cheltenham 𝔐	29·993	40·5	39·3	39·9	32·8	48·2	40·5	23·0	2nd	59·8	19th
5. ENGLAND, S.	Marlborough 𝔐	30·009	39·5	38·7	39·1	33·9	48·1	41·0	27·3	2nd	62·5	19th
	Strathfield Turgiss 𝔐	30·001	41·6	39·6	40·6	33·7	49·0	41·4	26·8	9th	63·5	19th
	Ramsgate 𝔐	30·032	41·3	40·2	40·8	36·0	48·0	42·0	29·6	24th	61·2	9th
	Folkestone	29·998	40·7	40·2	40·5	35·6	46·3	41·0	29·7	14th, 24th	56·4	19th
	Southampton	29·998	40·7	40·9	40·8	36·5	47·9	42·2	29·9	2nd	59·4	9th
	Hastings	29·999	41·0	41·0	41·0	36·9	46·4	41·7	30·3	24th	54·9	19th
6. SCOTLAND, W.	Laudale	29·869	38·7	38·5	38·6	32·7	44·5	38·6	22·6	13th	54·0	9th
7. ENGLAND, N.W.	Douglas (I. of Man)	29·932	40·4	39·1	39·8	34·5	45·2	39·9	28·8	13th	53·9	12th
	Llandudno 𝔐	29·950	42·7	41·0	41·9	37·4	46·3	41·9	28·0	26th	54·8	8th
8. ENGLAND, S.W.	St. David's	29·961	42·7	41·3	42·0	38·2	46·9	42·6	28·8	26th	54·0	19th
	Caermarthen 𝔐	29·976	42·1	40·1	41·1	35·6	50·7	43·2	24·7	2nd	61·9	19th
	Dartmoor 𝔐	29·981	37·9	36·0	37·0	32·7	46·4	39·6	23·4	25th	54·4	9th, 19th
	Babbacombe 𝔐	29·990	42·6	40·8	41·7	36·5	48·9	42·7	26·2	14th	56·6	16th, 29th
9. IRELAND, N.	Londonderry	29·910	40·1	39·5	39·8	34·8	45·0	39·9	25·2	28th	52·0	7th
	Brookeborough	29·860	37·6	39·0	38·3	32·7	46·1	39·4	22·8	13th	52·4	8th
	Markree Castle	—	40·6	40·0	40·3	33·2	48·3	40·8	21·5	13th	59·4	9th
10. IRELAND, S.	Dublin	29·948	41·8	42·1	42·0	37·5	47·4	42·5	31·5	1st	56·2	8th
	Parsonstown	29·941	41·2	40·2	40·7	32·9	49·1	41·0	25·1	13th, 22nd	56·5	7th
CHANNEL	Jersey (St. Aubin's)	30·029	44·8	43·2	44·0	39·4	49·7	44·6	31·2	14th	59·9	9th

NOTE.—The stations marked thus 𝔐 are in connection with the Royal Meteorological Society.

* At Durham the observations were taken at 10 a.m. and 10 p.m. each day.

STATIONS of the SECOND ORDER in the BRITISH ISLANDS, during the Month of MARCH 1879.
corrected for Diurnal Range.
Latitude, beginning in each case with the Station lying furthest North.)

TENSION OF VAPOUR.			RELATIVE HUMIDITY.			AMOUNT OF CLOUD (0 to 10).			RAINFALL.			WEATHER. No. of Days of							WIND. No. of Observations of								
At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
in.	in.	in.	%	%	%				ins.	ins.																	
·189	·182	·186	87	88	88	7·4	6·7	7·1	3·230	·400	3rd	18	8	2	0	3	14	10	4	3	8	17	10	6	8	3	3
·176	·167	·172	81	83	82	7·9	8·1	8·0	4·263	·755	4th	22	14	3	0	0	19	1	0	12	14	2	2	9	12	4	6
·211	·203	·207	84	89	87	6·0	5·4	5·7	0·778	·160	15th	16	11	2	0	6	11	1	3	2	14	2	6	16	7	6	6
·211	·186	·199	82	87	84	6·0	6·9	6·5	0·813	·170	15th	14	10	4	0	6	15	1	3	10	10	1	12	15	6	4	1
·215	·206	·211	90	88	89	6·8	5·9	6·4	1·200	·430	17th	17	4	0	0	5	14	0	4	6	10	5	1	16	11	4	5
·204	·190	·197	87	87	87	6·8	6·6	6·7	1·086	·194	28th	17	8	0	0	5	17	1	7	9	9	4	8	11	8	5	1
·222	·202	·212	86	87	87	7·7	7·1	7·4	0·739	·110	28th	15	7	1	2	3	18	3	3	7	13	6	2	21	4	5	1
·212	·209	·211	84	88	86	6·9	6·4	6·7	0·910	·190	30th	18	7	1	2	3	14	0	0	16	0	8	3	19	1	14	1
·217	·215	·216	88	87	88	7·4	7·3	7·4	0·780	·150	14th	12	6	0	0	3	17	0	3	10	10	7	3	12	9	6	2
·218	·213	·216	89	89	89	7·5	6·6	7·1	1·090	·270	17th	12	6	0	1	2	13	3	7	8	9	4	5	8	19	2	0
·195	·188	·192	87	86	87	8·2	6·5	7·4	2·735	·680	16th	15	9	0	1	3	15	0	2	1	15	7	0	10	9	14	4
·201	·194	·198	89	88	89	7·5	5·4	6·5	1·100	·300	16th	15	6	2	1	6	14	10	4	4	15	4	6	8	7	9	5
·208	·208	·208	85	85	85	7·9	5·7	6·8	0·680	·120	28th	14	4	0	0	5	15	0	3	19	0	5	3	23	3	3	3
·214	·201	·208	89	88	88	7·3	6·9	7·1	0·648	·109	28th	14	7	0	0	6	18	0	6	5	10	7	6	12	10	5	1
·207	·202	·205	86	85	86	7·7	6·6	7·2	0·780	·240	16th	13	8	0	0	5	17	1	6	11	8	3	7	15	7	4	1
·214	·207	·211	88	86	87	7·3	7·0	7·2	1·303	·350	17th	15	4	0	0	0	12	2	8	10	6	2	6	23	6	1	0
·227	·216	·222	88	88	88	7·6	6·9	7·3	0·980	·220	30th	14	4	1	1	2	16	0	6	6	10	4	9	12	9	6	0
·214	·213	·214	86	90	88	6·9	7·0	7·0	0·943	·230	30th	15	5	1	0	5	18	0	3	13	2	2	0	16	2	2	22
·217	·204	·211	81	81	81	7·6	6·5	7·1	0·478	·125	29th	9	6	0	0	5	18	0	3	14	2	5	4	12	12	8	2
·226	·224	·225	86	89	88	6·6	5·7	6·2	0·700	·130	11th, 28th	9	4	1	0	5	11	1	1	16	5	0	2	17	5	6	10
·225	·225	·225	88	89	88	6·9	6·6	6·8	0·830	·280	30th	11	6	0	0	4	12	0	9	9	13	0	7	14	9	1	0
·228	·232	·230	88	89	88	7·8	6·3	7·1	0·478	·145	28th	9	5	0	0	4	16	0	5	16	2	8	0	17	8	4	2
·222	·223	·223	85	86	86	5·8	6·4	6·1	0·900	·220	30th	18	3	0	0	6	12	1	6	20	5	0	7	12	7	3	2
·203	·202	·203	85	86	85	6·5	7·0	6·8	7·510	1·020	3rd	19	14	2	1	2	11	7	1	4	22	1	8	12	5	1	8
·221	·213	·217	87	88	87	7·6	5·7	6·7	2·660	·619	16th	16	8	1	1	2	12	4	2	3	14	4	2	18	6	3	10
·220	·213	·217	80	82	81	6·7	6·1	6·4	1·469	·320	16th	12	5	0	0	3	14	4	3	4	18	2	4	6	22	3	0
·244	·243	·244	88	92	90	7·1	5·5	6·3	1·010	·160	3rd	16	4	1	0	3	8	1	3	10	12	3	7	15	8	1	3
·235	·225	·230	86	88	87	6·8	5·6	6·2	2·750	·630	17th	15	1	1	0	6	12	0	8	1	14	5	1	13	6	2	12
·211	·206	·209	91	96	94	6·3	5·4	5·9	3·020	·750	26th	16	4	0	0	4	9	0	4	9	12	3	2	7	11	8	6
·231	·228	·230	83	88	86	6·7	6·1	6·4	0·560	·180	28th	13	3	0	0	5	13	2	6	17	6	0	3	19	6	4	1
·214	·217	·216	85	88	87	6·7	6·2	6·5	2·590	·570	4th	24	8	0	0	2	10	0	1	10	11	1	3	22	7	1	6
·204	·214	·209	91	90	91	7·5	7·7	7·6	2·224	·265	29th	19	†	†	†	1	17	8	0	20	2	1	2	14	7	5	11
·221	·223	·222	86	89	87	7·1	6·6	6·9	2·204	·345	17th	24	4	2	0	1	10	0	1	1	12	3	14	12	5	1	13
·224	·223	·224	83	83	83	6·5	6·2	6·4	1·827	·463	16th	16	7	7	0	4	10	1	3	3	16	3	1	10	23	1	2
·226	·232	·229	86	90	88	7·2	6·4	6·8	1·593	·339	16th	24	1	1	0	2	12	1	2	5	4	8	9	22	5	0	7
·245	·240	·243	82	85	84	7·2	5·7	6·5	1·337	·473	30th	10	2	3	1	5	15	0	4	13	13	4	5	9	4	7	3

† No observation.

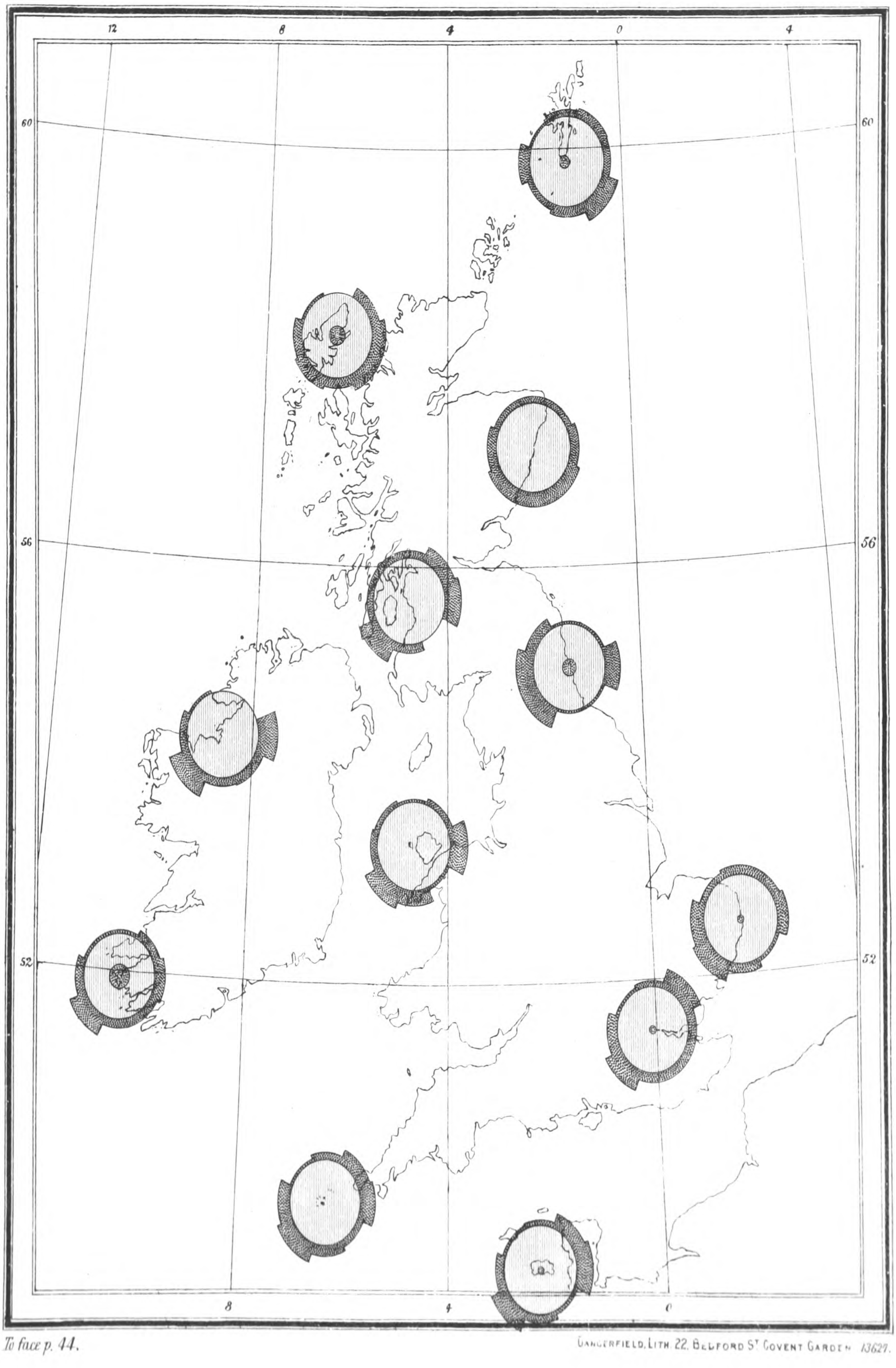
TABLE C., MARCH.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at TELEGRAPHIC REPORTING STATIONS in the BRITISH ISLANDS, during the Month of MARCH 1879. Observations are made at 8 a.m. daily.

(The Stations are grouped in Districts, and then arranged in order of Latitude, beginning in each case with the Station lying furthest North.)

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 8 a.m.	AIR TEMPERATURE.								TENSION OF VAPOUR.	RELATIVE HUMIDITY.	AMOUNT OF CLOUD.	RAINFALL.			WEATHER. No. of Days of							WIND. No. of Observations of								
			Means of				Absolute Extremes.																									
			At 8 a.m.	Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.				Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
		ins.	°	°	°	°	°		°		in.	%		ins.	ins.																	
0. SCOTLAND, N.	Sumburgh Head	29·868	35·5	30·9	39·9	35·4	18	15th	49	18th	·172	83	8·1	1·63	0·27	5th	21	6	0	0	1	14	9	3	4	3	8	4	2	5	1	1
	Wick	29·875	35·8	31·9	42·8	37·4	22	17th	55	30th	·199	94	6·8	2·40	0·38	11th	24	11	0	0	8	16	1	2	3	3	8	5	5	2	0	3
	Stornoway	29·867	35·7	31·1	42·5	36·8	21	17th	53	4th	·185	88	7·1	2·47	0·61	11th	18	4	0	0	6	15	3	1	1	3	5	9	6	6	0	0
	Thurso	29·793	37·0	32·2	41·9	37·1	25	14th, 15th	51	4th	·200	91	4·9	3·47	0·76	11th	17	3	1	0	12	7	14	0	3	6	6	3	5	4	1	3
1. SCOTLAND, E.	Nairn	29·867	34·8	31·0	43·0	37·0	22	17th, 18th	53	8th	·170	84	4·7	3·35	0·80	3rd	14	5	0	0	11	9	3	0	1	3	1	1	3	7	4	11
	Aberdeen	29·897	36·6	33·7	42·5	38·1	27	13th, 14th	52	4th, 5th, 7th.	·183	84	6·5	2·21	0·46	14th	16	12	6	0	4	7	1	2	2	4	6	6	5	4	2	0
	Leith	29·888	38·2	33·1	44·7	38·9	19	14th	55	29th	·204	89	6·5	1·90	0·41	15th	18	8	5	0	4	10	6	1	0	4	5	1	7	11	0	2
2. ENGLAND, N.E.	Shields	29·976	38·5	34·3	44·7	39·5	20	14th	55	8th, 9th	·212	91	7·0	0·63	0·23	15th	11	10	7	0	8	18	10	1	1	7	1	1	7	7	4	2
	Scarborough	29·957	38·7	35·6	44·5	40·1	29	13th, 14th, 15th.	56	12th	·222	91	7·5	0·96	0·21	17th	14	3	5	0	5	17	4	2	3	6	1	1	8	7	2	1
	York	29·969	37·8	33·1	47·1	40·1	24	14th	57	7th	·205	91	7·5	0·90	0·15	17th	17	3	0	1	7	20	0	5	1	6	2	4	6	5	2	0
3. ENGLAND, E.	Yarmouth	29·979	38·3	34·2	43·9	39·1	29	14th, 24th, 25th.	57	9th	·207	90	6·0	1·21	0·27	31st	15	3	1	2	11	12	5	3	3	6	1	3	7	5	2	1
	Cambridge	29·988	37·9	32·9	50·6	41·8	27	12th	68	19th	·209	92	6·9	1·21	0·53	31st	15	5	1	2	9	19	0	4	4	3	1	5	10	0	3	1
4. MIDLAND COUNTIES.	Nottingham	29·992	38·0	33·0	48·6	40·8	26	2nd, 8th	61	9th	·203	89	8·3	0·95	0·20	16th	13	5	0	0	5	23	2	4	3	2	2	5	9	1	3	2
	Oxford	29·995	37·3	33·7	47·4	40·6	28	25th, 26th	61	19th	·205	92	8·6	0·90	0·21	30th	14	6	0	0	3	24	0	3	4	5	1	3	7	4	1	3
5. ENGLAND, S.	London	29·987	38·8	34·5	49·8	42·2	28	2nd, 3rd	64	19th	·206	86	6·8	0·77	0·20	18th	13	6	0	0	7	16	3	2	7	3	3	3	8	3	1	1
	Dover	29·986	39·7	36·7	44·7	40·7	31	24th, 25th, 26th.	52	18th	·218	89	5·3	0·59	0·26	30th	12	2	0	0	10	6	0	3	7	6	1	0	5	9	0	0
	Hurst Castle	29·999	39·7	36·7	46·1	41·4	31	2nd, 7th	53	19th	·224	92	5·9	0·61	0·17	30th	10	2	0	0	9	13	0	3	9	3	1	1	7	4	2	1
6. SCOTLAND, W.	Ardrossan	29·898	38·9	34·8	45·2	40·0	23	14th	51	9th	·198	84	7·0	3·31	0·60	4th	21	7	0	0	6	16	5	2	5	8	0	3	9	2	2	0
7. ENGLAND, N.W.	Liverpool	29·962	39·3	35·7	46·0	40·9	29	14th	55	8th, 9th	·207	87	7·4	1·07	0·24	16th	13	2	0	0	7	19	0	1	3	7	3	2	8	4	1	2
	Holyhead	29·953	40·5	37·9	46·1	42·0	30	26th	52	8th, 12th	·231	92	5·6	1·46	0·40	2nd	14	0	0	0	8	6	3	1	2	9	1	5	8	3	2	0
8. ENGLAND, S.W.	Pembroke	29·962	41·3	38·3	45·8	42·1	30	25th, 26th	52	19th	·224	87	7·1	1·05	0·27	30th	15	2	0	0	6	16	2	3	5	3	5	3	9	3	0	0
	Prawle Point	29·993	41·5	37·5	47·7	42·6	30	14th, 25th, 26th.	56	11th, 21st	·237	91	7·2	0·93	0·37	29th	16	3	0	0	3	13	1	6	7	4	0	1	9	2	2	0
9. IRELAND, N.	Donaghadee	29·936	38·6	34·7	45·5	40·1	29	13th	52	4th, 7th	·216	93	6·0	2·01	0·62	17th	22	2	0	0	8	10	3	1	0	6	5	1	7	10	1	0
	Mullaghmore	29·887	39·8	36·2	46·1	41·2	30	28th	53	7th	·222	92	6·7	3·00	0·61	4th	21	4	0	0	9	15	10	0	0	9	4	3	11	3	1	0
10. IRELAND, S.	Kingstown	29·946	41·1	36·7	48·3	42·5	31	13th, 14th	57	4th	·214	83	6·5	1·76	0·51	16th	16	1	0	1	6	14	3	2	2	5	3	4	6	7	1	1
	Valencia	29·933	43·8	38·6	54·2	46·4	29	27th	55	7th	·240	84	8·0	2·59	0·70	28th	17	1	2	0	1	17	8	1	2	4	2	2	9	4	1	6
	Roche's Point	29·956	42·6	38·8	49·1	44·0	30	28th	56	12th	·229	84	7·0	2·42	0·86	28th	12	2	1	1	3	13	4	5	3	3	4	1	5	7	3	0
CHANNEL ISLANDS	Scilly	29·974	45·4	42·6	49·8	46·2	35	24th, 25th, 26th.	55	16th, 18th	·271	90	8·5	1·81	0·33	26th	21	1	0	0	0	20	9	2	6	6	1	3	7	5	1	0
	Jersey	29·968	42·5	39·6	47·7	43·7	32	14th	56	8th	·239	88	6·7	1·27	0·47	30th	13	2	0	2	6	14	1	2	6	7	1	2	8	3	1	1

MONTHLY WIND CHART. MARCH 1879.

Showing the Relative Prevalence of Wind for 8 points.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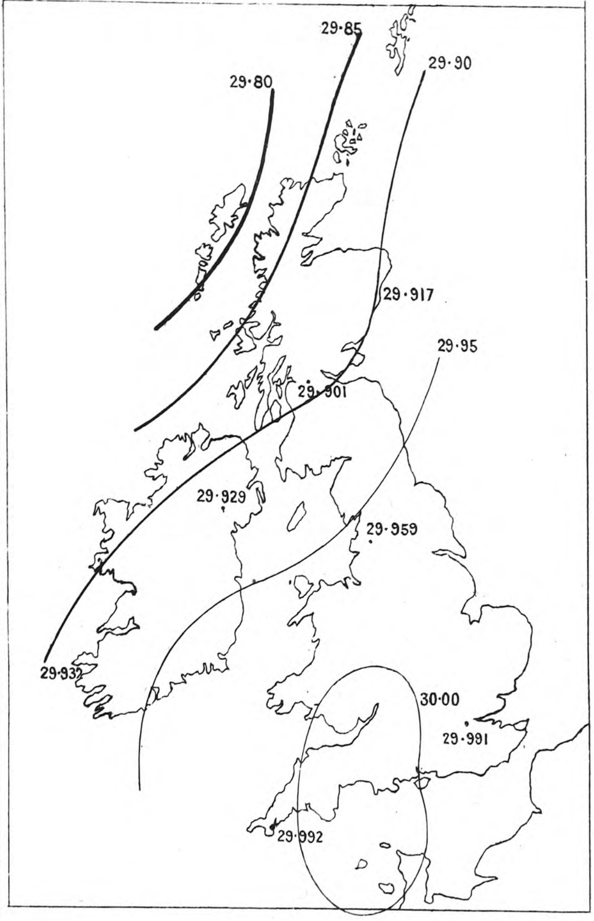
4
60
60
56
56
52
52
8
4
0

To face p. 44.

DANGERFIELD, LITH. 22, BEDFORD ST. COVENT GARDEN *13627.*

MONTHLY WEATHER CHART. MARCH 1879.

1. DISTRIBUTION OF MEAN PRESSURE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29·901
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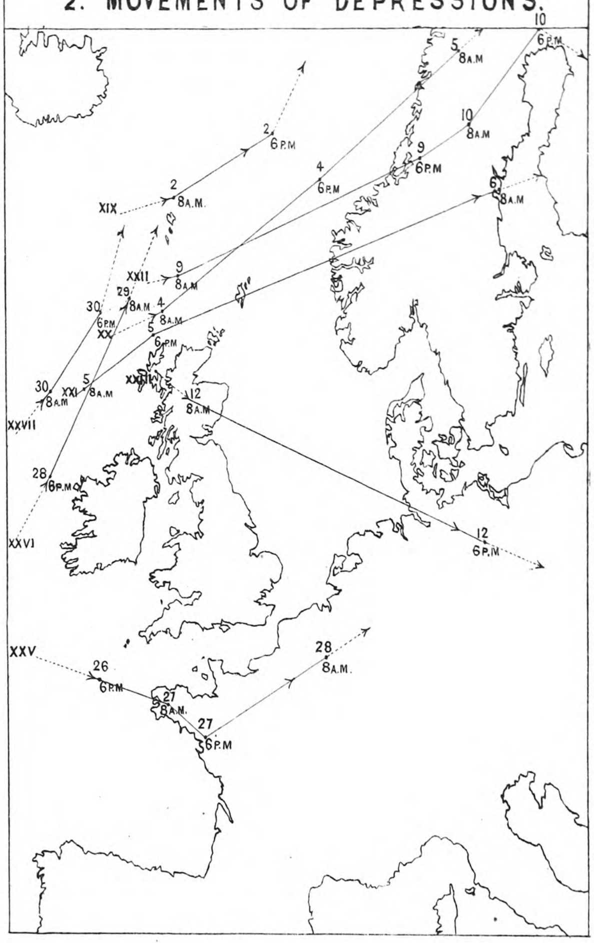
30·00
29·991
29·992

2. MOVEMENTS OF DEPRESSIONS.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5
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2
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10
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9
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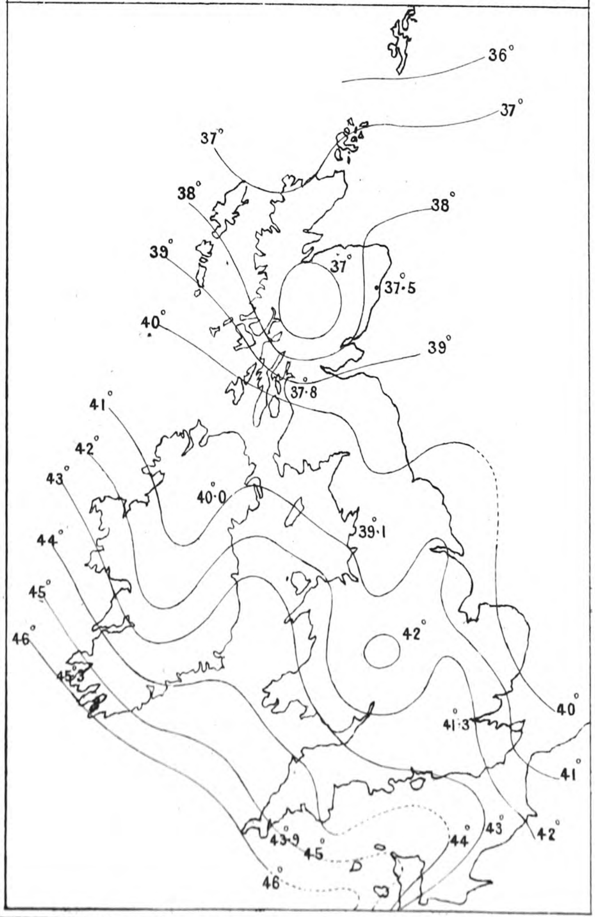
4
6 P.M.
2
8 A.M.
XIX
6
8 A.M.
XXII
9
8 A.M.
29
8 A.M.
30
6 P.M.
4
8 A.M.
XX
5
6 P.M.
30
8 A.M.
XXI
5
8 A.M.
XXIII
12
8 A.M.
XXVII
28
6 P.M.
XXVI
12
6 P.M.
XXV
26
6 P.M.
28
8 A.M.
27
8 A.M.
27
6 P.M.

3. DISTRIBUTION OF MEAN TEMPERATURE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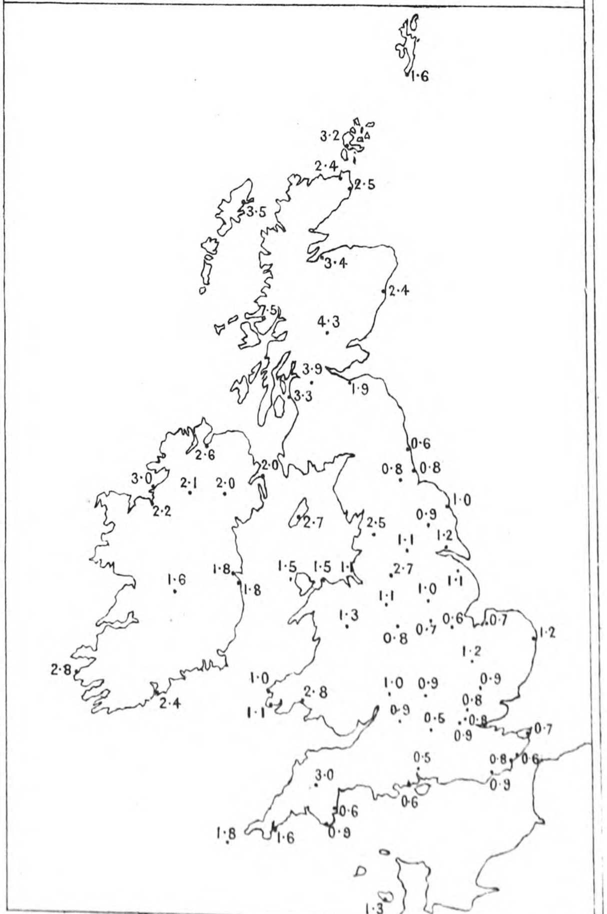
37°
38°
38°
39°
37°
37·5
40°
39°
37·8
41°
42°
43°
40·0
44°
39·1
45°
46°
42°
45·3
40°
41·3
41°
43·9
45
44°
43°
42°
46°

4. RAINFALL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2·4
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3·5
3·4
2·4
7·5
4·3
3·9
3·3
1·9
2·6
0·6
2·0
0·8
0·8
3·0
2·1
2·0
2·2
1·0
2·7
2·5
0·9
1·1
1·2
1·8
1·5
1·5
1·1
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2·8
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2·4
1·1
0·9
0·5
0·8
0·9
0·7
0·5
0·8
0·6
3·0
0·9
0·6
0·6
1·8
1·6
0·9
1·3

To follow Wind Chart for March.

Dangerfield Lith. 22, Bedford St. Covent Garden 13677

PART II.

SECTION I.

GENERAL SUMMARY FOR THE QUARTER.

This quarter was remarkable for the persistent succession of disturbances, for the most part shallow and unaccompanied by very strong winds, which passed over or contiguous to our Islands, and which kept the weather in a most unsettled state, causing large quantities of rain, and keeping the temperature very low and unseasonable. It was only during a few brief intervals that anticyclonic conditions prevailed, and even then in some instances the general distribution of pressure was such as to produce unfavourable weather over the United Kingdom. As a result the three months proved to be colder all over the United Kingdom than any corresponding period had been since 1866, the earliest year for which suitable data exists for making a comparison. Over a large portion of the kingdom the fall of rain was also considerably in excess of the average.

April 1st-11th.—At the beginning of the month the lowest barometer readings were reported from Scotland and the highest from eastern Europe; but as pressure was uniformly low over the whole of western Europe the gradients over the British Isles were slight, with quiet and fair, but rather cool, weather. During the first few days no important change occurred, except a decided rise of temperature in the west on the 3rd; but at the close of the 4th a brisk fall of the barometer began, and gradients increased for Southerly winds. On the 6th a small V-shaped depression, which was apparently subsidiary to a much larger disturbance lying to the westward of our coasts, reached Saint George's Channel, and caused a Westerly gale to blow at Scilly, a Southerly gale at Pembroke, and a moderate Northerly gale at Roche's Point. A few hours later this disturbance was succeeded by a new cyclonic centre (No. XXVIII.), which remained over the British Isles for a couple of days without much change in position, but becoming meanwhile gradually filled up, the barometer having begun to rise again on the 7th very generally and briskly. In the meantime pressure had also increased considerably over Scandinavia, and its general distribution over Europe had thus become altered, so that on the 10th, while an anticyclone lay over Scandinavia, a large area of low readings lay over southern Europe, and gradients for moderate or fresh Easterly winds had become general over the United Kingdom, with cold weather. Next day, however, the rise of the barometer ceased; at our northern stations it began to fall again and the anticyclone began to disperse, and by the close of the day the fall had become general all over the kingdom.

April 12th-18th.—The changes which occurred in pressure during this interval were both gradual and slight. On the 13th, however, (by which time the northern anticyclone had become quite dispersed), a well-marked depression (No. XXIX.) reached the Bay of Biscay, and caused the gradients for Easterly winds to become rather steeper over the United Kingdom, and on the following morning, when the centre of the disturbance was close to Brest, the wind rose to a strong North-easterly gale at the mouth of the Channel, and to a fresh or strong breeze at most of our southern stations, with dull and cool weather. The centre of the depression remained almost stationary till the close of the 15th, when it moved away to the eastward, and the barometer began to rise at most of our stations and continued to do so till the 18th. A band of relatively high pressure had by that time become developed over Great Britain, with areas of low pressure over the ocean to the westward, and over the

E 51740. 300.—10/87. Wt. 6485.

Baltic to the eastward; light or moderate Southerly winds blew on our western coasts and Northerly winds on our eastern shores with fine weather, but from the Baltic a Northerly gale was reported. Before the close of the day, however, the barometer had again begun to fall at our western stations.

April 19th–27th.—In the course of the 19th the fall of the barometer just referred to became general, the belt of high pressure disappeared, and the gradients for Southerly winds spread and at the same time became steeper. This change was due to the approach of a depression (No. XXXI.) which reached Ireland during the ensuing night. It was not, however, until the 23rd that any decided rise of the mercury followed, and in the meantime the centre of the disturbance spread out into a large area of low pressure extending right across Great Britain to Germany, with light or moderate winds, and dull, cold weather. During the night of the 22nd a new shallow depression (No. XXXII.) reached Ireland, and as it moved eastwards to the Continent, pressure rapidly increased in its rear, so that by the close of the 24th the barometer had become fairly high and very uniform all over the United Kingdom. This state of things proved, however, to be very temporary, and at the close of the day a fresh fall had set in in the west, which soon became general. A disturbance passed outside our western coasts on the 25th, and this was followed on the 26th by another (No. XXXIII.), which took a south-easterly course across France to Italy. A fresh general recovery of pressure at once ensued, accompanied by a great improvement in the weather, and at the close of the 27th an anticyclonic system, which had been lying for a day or two over Scandinavia, was approaching our northern coasts, and gradients for moderate Northerly or North-easterly winds were becoming established.

April 28th–May 7th.—Throughout this period anticyclonic conditions prevailed over the United Kingdom, the centre of the high-pressure system lying for some days right over the British Isles, and during the remainder of the period to the westward of them. With the exception of a slight fall which occurred on the 30th, and which was scarcely felt except at the western stations, the barometer rose pretty generally till the 5th, although after the 1st the movement of the mercury was only slight; and light airs, with clear and fine, although cool, weather, prevailed. On the 5th, however, a somewhat sudden change took place, and the barometer began to fall briskly at the northern stations under the influence of a depression which was then approaching northern Europe, but the centre of which was apparently beyond the limits of the area embraced in these remarks. It had the effect, however, of causing steep gradients for Northerly winds over the British Isles, and during the ensuing night and on the morning of the 6th it blew a gale on our northern and eastern coasts, while the weather became dull, and showers of rain, hail, and sleet fell. Simultaneously with this change the centre of the anticyclone moved to the westward where it lay, off the Irish coast, till the close of the 7th, during which interval fresh or strong Northerly winds with cold inclement weather continued to prevail.

May 8th–26th.—The anticyclone now became entirely dispersed, although for some days the general distribution of pressure remained unaltered. Another depression (No. XXXIV.) passed to the northward of Scotland on the 8th, and caused a sharp fall of the barometer in that country, and a less abrupt fall over the remainder of the United Kingdom, while the wind temporarily backed to North-west and West. A slight rise of the mercury ensued, but on the 10th another brisk fall took place in the north-west, the wind backing, with a rise of temperature, under the influence of a depression passing outside our western coasts. A couple of days of quiet and moderately mild weather followed, during which a slight recovery of pressure occurred; but on the 13th the barometer again gave way upon the approach of a large but shallow area of low pressure (No. XXXV.), which, after travelling across England, remained nearly stationary for several hours near our eastern coasts, and caused fresh Northerly winds and cold weather to prevail over the United Kingdom. Another disturbance (No. XXXVI.) followed on the 17th, also travelling eastwards to the Continent; like its immediate predecessor it was not deep, but it was well-marked, and in its rear the wind blew strongly from the North-west. The subsequent rise of the barometer was retarded for a short time by the passage of an unimportant depression outside our western coasts, but on the 20th it became general, and continued till the close of the day, by which time pressure had become moderately high and very uniform over the greater part of Europe. This condition did not, however, continue very long, and the area of high pressure was quickly divided into two distinct areas by the arrival of a depression upon our north-western coasts on the 22nd. One of these centres of maximum readings moved to the south-west of our coasts and the other to northern Europe; a band of lower readings stretching between them, in a south-easterly direction, from our northern coasts to Germany. A series of depressions now began to pass near our western coasts, and after the 23rd the barometer steadily gave way at all our stations, while the weather, which had improved a little, again became very unsettled. At the close of the 25th the barometer was still falling, with a moderate Westerly wind, while the high-pressure area over northern Europe had entirely disappeared. On the 26th, however, a shallow depression (No. XXXVII.) passed over our northern coasts, and in its rear pressure again recovered itself to a slight extent over Scotland, and at the same time in a more marked degree over northern Europe, but at our southern stations it continued to give way.

May 27th–June 9th.—A long interval of unsettled and very unseasonable weather now commenced, during which the barometer continued uniformly low, while depressions of more or less importance followed each other in quick succession across our Islands or over the adjoining regions. The variations of pressure caused by these systems were in no case very large, and the accompanying winds were rarely very strong; but a good deal of rain fell, and the weather continued cold, although during the latter half of the period the temperature rose somewhat in the south-east and became higher there than it had been for some weeks. The first depression of the series (No. XXXVIII.) was a small one of only local importance, which was first observed over the north-west of France on the 27th, and which, after causing a Northerly gale to blow at the entrance to the Channel, moved away towards the south of Ireland and disappeared. Later on another (No. XL.) reached the mouth of the Channel and passed across southern England to the Continent, and in this case as in the one just mentioned, the barometer was very little affected except at our southern stations. On the 9th the last disturbance of this series (No. XLI.) passed away beyond our north-western coasts, and a steady rise of the barometer took place all over the United Kingdom. On the Continent, too, the barometer had been rising for some hours, and by the close of the day pressure had become moderately high and very uniform over the greater part of Europe, the lowest readings being found over the west of Scotland, where the depression was fast disappearing.

June 10th–15th.—During this short interval the general distribution of pressure was different from that which had prevailed over Europe for some time, but the accompanying weather which was experienced over the British Isles showed very little, if any, improvement, and continued, as it had been for so long, cold and unsettled. The uniform distribution of pressure referred to at the close of the last paragraph was soon disturbed; in the north it gave way, while in the south the barometer rose, and for a day or two a small anticyclonic system maintained itself over the Peninsula and southern France. On the 14th this system moved towards Germany and thence eastwards to central Europe, where it became dispersed. Meanwhile some shallow depressions, unaccompanied either by strong winds or by any important barometric oscillations, skirted our coasts, producing dull, rainy weather and causing the wind to vary between South-east and West as they approached or receded from our shores. On the 15th, however, a somewhat decided fall of the barometer set in in front of a depression which was moving towards our south-western coasts in a more easterly direction than its immediate predecessors had done; but gradients continued slight and the winds light, although towards the close of the day rain fell heavily at our south-western stations.

June 16th–30th.—The depression just referred to proved to be a large shallow system of low-pressure (No. XLII.) which moved very slowly across Great Britain to the North Sea and Scandinavia. In its rear the barometer rose again very generally on the 17th; but before the close of the following day a fresh fall had set in in the west, preceding the arrival of another disturbance (No. XLIII.) which skirted our western littoral and caused a Southerly gale to blow at some of our western stations. This depression was immediately followed by another and deeper one (No. XLIV.), which made its appearance to the westward of Ireland on the morning of the 21st, and passed across the northern half of the kingdom during the ensuing 24 hours, the wind rising for a portion of that time to a fresh Westerly gale at the southern and south-western stations. The recovery of pressure which followed was again very short-lived, and in the west the barometer began to fall during the afternoon of the 22nd, while the wind backed once more to the Southward. Another shallow depression (No. XLV.) passed across Scotland on the 24th and 25th, and a deeper one (No. XLVI.) travelled past our western coasts in a northerly direction on the 26th. This was in its turn immediately succeeded by another, or rather two other systems (Nos. XLVII and XLVIIa.), both of which were rather deeper than most of their predecessors had been, and producing steeper gradients, caused strong Southerly gales to blow on all our western coasts, and fresh or strong winds over the rest of the United Kingdom. Throughout this interval the variations of the barometer were continuous and often abrupt, and the weather was cold, dull, and unsettled, with a good deal of rain. A general rise of the mercury, which was accompanied by a temporary improvement in the weather, began on the 28th and continued throughout the following day, during which time a small anticyclonic system showed itself over France and part of Germany. At mid-day on the 30th, however, a sudden and very rapid fall of the barometer began at Valencia, and quickly became extended to our other stations. This was due to the advance of a deep depression (No. XLVIII., see Tables, Part III.), which reached the Irish coast about midnight, bringing with it a renewal of the disturbed, unseasonable weather which had been so persistent a feature in the meteorology of the month. Before the close of the day the fine weather had disappeared, and in the west heavy rain had set in. The area of high pressure over France had also begun to give way, although readings still remained relatively high over the Continent, and a large area of low pressure lay over the ocean to the north-west of the British Isles.

SECTION II.

TABLE OF CYCLONIC SYSTEMS.—APRIL 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. XXVIII. April 7-8.	No. XXIX. April 13-16.	No. XXX. April 18-21.
Form	Circular	Circular, becoming elongated	Varying.
Size	Large	Large	Large.
Depth	Moderate	Moderate	Moderate.
Where first Observed	Over the south-west of England	Bay of Biscay	Over Germany.
Direction of Motion	Northerly	At first northerly, then stationary, then easterly.	Northerly.
Rate of Motion	Very slow	Very slow	Slow.
Regions passed over by Steepest Gradients.	The north of France, eastern portion of England, and the North Sea.	The British Isles and the mouth of the Channel.	Scandinavia, Denmark, and northern Germany.
Termination	Dispersed	Disappeared over Germany after becoming partially filled up.	Travelled away over Lapland.
Time under Observation	Two days	About three days	About three days.
Accompanying Winds	North-easterly over Ireland, Easterly over Scotland and northern England, Southerly over southern England; afterwards becoming Southerly over Great Britain, and falling light.	Easterly, backing to North; strong in the south-west; moderate elsewhere.	Strong Northerly winds over Scandinavia, backing to North-west and moderating. The winds over Great Britain were not much influenced by this depression.
„ **Weather**	Moderately fine in the south-west, but dull, wet, and unsettled elsewhere.	Cold and dull, with rain, sleet, and snow at many stations.	Over the British Isles the weather was generally fine, especially over England and Scotland. Snow fell in Sweden.
„ **Rainfall**	Very general, and at some northern stations heavy.	Very general, and at one or two stations rather heavy.	Slight, and not general.
REMARKS	This depression was preceded on the 5th by a large cyclonic system which skirted our north-western coasts, the centre keeping some distance to the westward; and on the 6th by a small secondary disturbance which was observed at 8 a.m. over southern Ireland, and which later in the day moved away to the westward of Scotland. With both these systems gradients were rather steep, and strong Southerly winds blew at some western stations.	From the evening of the 13th till the close of the 15th this depression remained stationary over Brittany; but by 8 a.m. of the 16th the centre had moved to near the Straits of Dover, and had begun to fill up, and a few hours later it had passed out of our area to the eastward, while in its rear pressure became relatively high for a short time.	This depression had apparently travelled northwards from the Mediterranean, and seems to have become combined with other low-pressure centres over the Baltic. An area of relatively high pressure lay over Great Britain when the depression was first observed within the limits embraced by our observations, but before the depression had passed away this area had become dispersed in front of a new depression, No. XXXI., which appeared upon our south-western coasts.

TABLE OF CYCLONIC SYSTEMS.—APRIL 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. XXXI. April 19-23.	No. XXXII. April 23-24.	No. XXXIII. April 26-28.
Form	Irregular	Elongated	Circular
Size	Moderate	Moderate	Large
Depth	Shallow	Shallow	Shallow
Where first Observed	To the westward of Ireland	Over south-western Ireland	Off the western coast of Ireland
Direction of Motion	Easterly, then north-easterly	Easterly	South-easterly
Rate of Motion	Slow	Slow	Moderate
Regions passed over by Steepest Gradients.	The British Isles	Western France and the Bay of Biscay.	The British Isles and France
Termination	Disappeared over the Baltic	Became dispersed	Disappeared over south-eastern Europe.
Time under Observation	Three and a half days	One day and a half	Two and a half days
Accompanying Winds	Strong South-easterly winds and gales at the western and south-western stations; becoming Easterly at all except the southern stations, where it veered to the Westward, and then moderated generally.	Light or moderate Easterly winds over the greater part of Great Britain, but strong North-westerly winds at our south-western stations and on western coast of France.	Southerly, backing to Easterly and then to Northerly; moderate.
„ Weather	Cold, wet, and dull, except in Scotland and the north of England, where at first it was fine and clear.	Dull and unsettled with rain at most of our stations and in the west of France.	Dull and cloudy, with showers
„ Rainfall	General over the south of England and over Ireland, and very heavy in the south-west of Ireland.	Pretty general, but not heavy	Rain fell at most stations, but nowhere heavily.
REMARKS	When this depression first made its appearance pressure was relatively high over Great Britain, and the preceding system (No. XXX.) was still observed over the Baltic. As it advanced, it apparently became combined with other low-pressure centres, while the high pressure gave way and moved to the south of Europe. The system may therefore be more fitly described as a series of depressions, rather than as a single one, and in consequence the distribution of pressure was at times rather complex.	This was a shallow depression unaccompanied by strong winds except upon its south-western side. It was succeeded by a rather marked development of the high-pressure area lying over the Peninsula.	This depression was preceded by an apparently small disturbance which skirted our western coasts on the 25th, while the centre of the present system did not reach Valencia till the afternoon of the 26th. On the morning of the 27th the centre lay over France, and 24 hours later it was not far from Trieste. Gradients were at no time steep.

TABLE OF CYCLONIC SYSTEMS.—MAY 1879.

No. XXXIV. May 8-10.	No. XXXV. May 13-16.	No. XXXVI. May 17-18.
Probably circular	Circular	Oval.
Large	Large	Large.
Moderate	Shallow	Shallow.
To the northward of Scotland	Over Great Britain	Over Ireland.
North-easterly	Easterly	Easterly.
Slow	At first rapid, then very slow	Very slow.
Scandinavia and the North Sea	The British Isles and north-western France	The Channel.
Travelled to the northward of Norway	Became filled up over Germany	Disappeared over Belgium.
About 2 days	Nearly three days	Two days.
North-westerly, veering to North; moderate or fresh. Over the Baltic fresh Southerly winds blew, while Westerly winds were reported from Denmark.	Northerly; moderate to strong	Light to moderate Easterly winds over the greater part of the kingdom, with fresh or strong Northerly to North-westerly winds in the south-west.
Dull and cloudy generally; but in the north squally and cold, with snow and rain.	Unsettled and dull, with rain showers, and at a few places slight thunderstorms.	Cloudy and unsettled, with rain at most stations.
Rain fell in most parts of the United Kingdom, but the fall was nowhere heavy.	General, and at some stations in the north heavy	General, but slight.
Another depression had passed in an easterly direction across northern Europe on the 6th and 7th, at which time an anticyclone lay over the British Isles, and although the centre of the disturbance lay beyond the limits of our area, it had the effect of steepening the gradients over Great Britain, and causing the Northerly wind which prevailed to freshen to a slight gale at some stations. The present system passed nearer to the British Isles, and caused the anticyclone to give way very considerably.	This depression appeared to travel quickly across England during the latter part of the 13th. After reaching the east coast on the 14th, it moved but very slightly for some hours, and finally travelled over the Netherlands and Germany, becoming gradually filled up *en route.*	This depression, though slight, was well-marked. It is not very clear what became of it during the night of the 18th, but possibly it became united to another shallow disturbance, which on the morning of that day lay over Germany, and which was then moving apparently to the northward.

TABLE OF CYCLONIC SYSTEMS.—MAY–JUNE 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. XXXVII. **May 26.**	No. XXXVIII. **May 27-30.**	No. XXXIX. **May 30-June 1.**
Form	Circular	Circular	Elongated
Size	Moderate	Moderate	Large
Depth	Shallow	Shallow	Moderate
Where first observed	South-west of Scotland	Over the Channel and the north of France.	Over southern Sweden
Direction of Motion	Northerly	At first nearly stationary; then northerly.	North-westerly
Rate of Motion	Moderate	Very slow	Very slow
Regions passed over by steepest Gradients.	England	The British Isles and north-west France.	Denmark, the Baltic, and southern Sweden.
Termination	Passed off to the northward of Scotland	Became filled up over our western coasts.	Disappeared over the North Sea
Time under Observation	Less than one day	About three and a half days	About two days
Accompanying Winds	Moderate Westerly winds veering to North-west at our western stations.	At first Northerly in the north and west, and Southerly in the south-east of England; then North-easterly generally. Force rose to a gale in the West, fresh or strong elsewhere; then moderated generally.	North-easterly to Northerly over Norway and Scotland; Westerly over Denmark and the south of Sweden. Fresh over the former regions, strong to a gale over the latter.
„ **Weather**	At first fine in the south-east of England, but cloudy and unsettled elsewhere; later in the day it became generally cloudy with rain.	Unsettled and overcast in most districts, but occasionally fair in the north and south-east. Some severe thunderstorms were experienced.	Cloudy in the north of Great Britain, with rain at some stations.
„ **Rainfall**	General, but not heavy	Rain fell in most parts of the kingdom, and occasionally the falls were very heavy.	Rather heavy in some parts of Scotland; slight elsewhere.
REMARKS	This depression was not accompanied by very strong winds, and did not remain very long under observation. It was first noticed on the morning of the 26th; 10 hours later its centre was apparently over north-eastern Scotland; and by the following morning it had quite disappeared to the northward.	This system appears to have become developed over the north of France during the night of the 26th. It moved at first to Brittany and became deeper, causing a strong Northerly gale to blow at the mouth of the Channel, but subsequently it became partially filled up, and moving slowly to the north-westward it disappeared over south-west Ireland.	This depression was first observed over the south of Sweden on the morning of the 30th; its movement to the westward was very slow, the centre becoming deeper during its progress. On the morning of the 1st it passed away over the ocean to the westward of Norway.

TABLE OF CYCLONIC SYSTEMS.—JUNE 1879.

No. XL. June 2-4.	No. XLI. June 8-9.	No. XLII. June 16-19.
Elongated	Apparently elongated	Irregular.
Large	Large	Large.
Moderate	Shallow	Shallow.
At the mouth of the Channel	Off our south-western coasts	Over the south-west of England and the mouth of the Channel.
North-easterly	Northerly	North-easterly.
Moderate	Very slow	Very slow.
The Channel, France, and the Netherlands	England, and the Channel	The Channel and south-west England.
Disappeared over Finland	After becoming partially filled up it disappeared off our north-western coasts.	Filled up over Scandinavia.
About two days	About a day and a half	Three days.
Northerly in the north and west, Westerly in the south; strong to a gale in the latter region, moderate elsewhere.	Generally Southerly, veering to West in the south-west; moderate in force.	Light or moderate Easterly winds in the north; fresh or strong Westerly winds in the Channel and north-west France. Later on moderate Northerly winds became general.
Wet, dull, and unsettled; clearing up in the rear of the depression.	Dull and showery; improving during the 9th	Dull and unsettled, with rain and thunder; improving somewhat afterwards.
General over the south, south-east, and east of Great Britain; heavy at several stations.	General, but as a rule slight in amount	General, and in places heavy.
Some small depressions had been observed over the British Isles during the 1st and 2nd, and one of them lay over the north of Ireland just before the present system made its appearance at the mouth of the Channel. The centre of this system passed over the southern counties of England, where alone the barometer was affected by it, except to a slight extent. It caused a Southerly gale in the Baltic, and at some Channel stations the wind was also strong, but as a rule the accompanying winds were only of moderate force.	This system had been preceded on the 6th and 7th by a shallow depression which extended itself over England from St. George's Channel, unaccompanied, however, by strong winds, although it kept the weather in an unsettled state.	During the 16th this disturbance increased in intensity, and on the 17th a large area of low pressure, having two or three distinct minima, covered the greater part of Great Britain and the German Ocean. By the 18th it had reached Denmark and southern Scandinavia, and was apparently becoming filled up, and soon afterwards it disappeared altogether.

TABLE OF CYCLONIC SYSTEMS.—JUNE 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. XLIII. June 19-20.	No. XLIV. June 21-23.	No. XLV. June 23-25.
Form	Unknown	Circular	Elongated
Size	Probably moderate	Moderate	Large
Depth	Shallow	Moderate	Shallow
Where first Observed	Off the west coast of Ireland	South-west of Ireland	Over Ireland
Direction of Motion	Northerly	North-easterly	North-easterly
Rate of Motion	Slow	Moderate	Slow
Regions passed over by Steepest Gradients.	Ireland and the western coasts of Great Britain.	The British Isles	Great Britain and the Channel
Termination	Disappeared to the northward of Great Britain.	Passed away over Finland	Disappeared over Norway
Time under Observation	About 30 hours	About two and a half days	Two days
Accompanying Winds	Southerly, veering to South-west, and in the Channel and north of France to West; strong to a gale in the west, moderate to fresh elsewhere.	Southerly; veering to West in the Channel and to North-west in the north; fresh to strong, rising to a gale in the south and west.	Fresh Southerly winds, veering to West and moderating. Light Easterly winds were felt in the north of Scotland.
„ **Weather**	At first fine on our east coasts, dull and wet elsewhere; afterwards becoming cloudy in the east, but improving in the west.	Unsettled, cloudy, and wet, improving in the south-east and south as the depression passed away.	Unsettled, dull, and rainy, with thunderstorms in England and Ireland.
„ **Rainfall**	Very general; and rather heavy at some western stations.	Very general; and in the east of Scotland very heavy.	Very general. Heavy in the south-west of England and east of Scotland, moderate elsewhere.
REMARKS	The centre of this system kept entirely to the westward of our coasts, and therefore nothing definite is known as to its size and form. When it arrived the preceding system was still observed over Scandinavia.	The centre of this depression passed across the north of England and the south of Scotland, its path lying between Stonyhurst and Glasgow; although not very deep, it was a well-marked system.	Although this system was not deep, it kept the weather in a very disturbed state. After reaching the coast of Norway it apparently moved in a rather more northerly direction, and keeping near the coast it disappeared to the northward.

TABLE OF CYCLONIC SYSTEMS, JUNE 1879.

No. XLVI. June 26.	No. XLVII. June 27.	No. XLVIIA. June 28.
Unknown	Unknown	Unknown.
Large	Large	Moderate.
Moderate	Moderate	Moderate.
To the westward of Ireland	To the westward of Ireland	To the north-west of Ireland.
Northerly	Northerly	Northerly.
Moderate	Moderate	Moderate.
The British Isles	The British Isles	The British Isles.
Disappeared to the northward of Scotland	Travelled away to the northward of Scotland	Passed away over the Northern Ocean.
About 12 hours	About half a day	About half a day.
Fresh or strong Southerly or South-westerly winds.	Southerly or South-westerly winds; strong; a gale in the west and south-west.	Fresh or strong Southerly or South-westerly winds.
At first clear at some southern stations, but later on cloudy and dull generally, with rain.	Dull, with rain or fog	Generally cloudy and dull, with rain, except in the south-east and south.
Very general, but heavy at only a few western stations.	General, except in the south-east, but nowhere heavy.	Some heavy showers in the north-west; fall slight elsewhere.
The centre of this depression kept to the westward of our Islands, and not much is known of its size and form.	Like its predecessor, this system did not come sufficiently close to our shores to allow its details to be accurately made out. The gradients caused by it were, however, steeper, and it was accompanied by a strong South-westerly gale in the south-west, while a Southerly gale blew all along our western littoral.	This system seems to have been subsidiary to the preceding one. It appeared further to the northward, and affected the barometer only at the Scotch and Irish stations, but like its two immediate predecessors it kept well to the westward of our shores. As it passed away the barometer rose, and an area of relatively high pressure became developed over France.

TABLES OF GALES.

No. 14. (Cyclonic System, No. XXIX.)

Stations.	Velocity 30-40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour.				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks.
	Commenced.	Direction of Wind.	Commenced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
April 13-14, 1879.													
Holyhead.	10 a.m. (13th).	E. by N.	—	—	—	—	Midt. (13th).	E. by N.	14	2 p.m. (13th). 5 p.m. (13th).	E.N.E. E.	36	—
	8 a.m. (14th).	N.E.byE.	—	—	—	—	11 a.m. (14th).	N.E.byE.	3	9 a.m. (14th).	N.E.byE.	35	—
	Noon (14th).	N.E.byE.	—	—	—	—	3 p.m. (14th).	N.E.byN.	3	2 p.m. (14th).	N.E.byN.	32	—
Falmouth.	9 p.m. 13th).	E.	—	—	—	—	*See* remark.		4	Midt. (13th).	N.E.	33	Clock stopped from 1 a.m. till 10 a.m. 14th; the velocity at Midt. 13th was 33 miles, and at 11 a.m. 14th 54 miles, per hour.
	—	—	11 a.m. (14th).	N.E.byE.	47	6	8 p.m. (14th).	N.E.byN.	9	11 a.m. (14th).	N.E.byE.	54	—
Yarmouth	11 p.m. (13th).	N.E.byE.	—	—	—	—	7 a.m. (14th).	E.N.E.	8	1 a.m. (14th). 2 a.m. (14th). 5 a.m. (14th).	N.E.byE. N.E.byE. E.N.E.	34	—

No. 15. (Cyclonic System, No. XXXV.)

Stations.	Velocity 30-40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour.				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks.
	Commenced.	Direction of Wind.	Commenced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
May 14-15, 1879.													
Seaham	5 p.m. (14th).	N.byW.	11 p.m. (14th). 6 a.m. (15th).	N. N.	42 46	4 6	1 p.m. (15th).	N. by E.	20	9 & 10 a.m. (15th.)	N.	50	—
	4 p.m. (15th).	N.	—	—	—	—	1 a.m. (16th).	N.	9	7 & 8 p.m. (15th).	N.	37	—
Stonyhurst.	1 p.m. (15th).	N.W.	—	—	—	—	3 p.m. (15th).	N.W.byN.	2	1 p.m. (15th).	N.W.	33	—
Holyhead.	11 a.m. (14th).	N.N.W.	5 p.m. (14th).	N.N.W.	41	1	6 p.m. (14th).	N.N.W.	7	5 p.m. (14th).	N.N.W.	41	30 miles were also recorded at 8 p.m. and 11 p.m. 14th.
	1 a.m. (15th).	N.W.byN.	—	—	—	—	8 p.m. (15th).	N. by W.	19	5 a.m. (15th).	N.N.W.	39	—
Falmouth	11 a.m. (15th).	N.W.byN.	—	—	—	—	3 p.m. (15th).	N.W.	4	11 a.m. (15th).	N.W.byN.	4	—

No. 16. (Cyclonic Systems, No. XLVII. and XLVIIa.)

Stations.	Velocity 30-40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour.				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks.
	Commenced.	Direction of Wind.	Commenced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
June 27-28, 1879.													
Sandwick.	1 p.m. (27th).	S.E. by S.	2 p.m. (27th).	S.S.E.	43	1	9 p.m. (27th).	S. by E.	8	2 p.m. (27th).	S.S.E.	43	—
	10 a.m. (28th).	S.S.E.	—	—	—	—	4 p.m. (28th).	S.W. by S.	6	Noon, 1&2p.m. (28th).	S.S.E.	35	—
Alnwick Castle.	Noon (28th).	S.S.W.	—	—	—	—	6 p.m. (28th).	S.W.	6	5 p.m. (28th).	W.S.W.	35	—
Seaahm -	2 p.m. (28th).	S.W.	—	—	—	—	4 p.m. (28th).	S.W.	2	2 p.m. (28th).	S.W.	31	—
Stonyhurst.	2 p.m. (27th).	S. by E.	—	—	—	—	5 p.m. (27th).	S. by E.	3	2&3p.m. (27th).	S. by E.	34	—
Holyhead.	1 a.m. (27th).	S.	6 a.m. (27th).	S. by E.	45	13	10 p.m. (27th).	S. by W.	21	Noon (27th). 3 p.m. (27th).	S. by E. S.	50	—
	1 a.m. (28th).	S. by E.	4 a.m. (28th). 1 p.m. (28th).	S. S. by W.	46 40	7 4	10 p.m. (28th).	S.S.W.	21	8 a.m. (28th). 9 a.m. (28th).	S. by E. S. by W.	40	—
Valencia	9 p.m. (26th).	S.S.E.	Midt. (26th). 1 p.m. (28th). 4 p.m. (28th).	S. S.W. S.W. by S.	47 41 40	31 1 1	5 a.m. (29th).	S.W.byS.	56	2 p.m. (27th). 3 a.m. (28th).	S.S.W.	56	—
Falmouth.	7 a.m. (27th).	S.S.W.	—	—	—	—	6 p.m. (27th).	S.S.W.	11	11 a.m. (27th).	S. by W.	39	—
	9 a.m. (28th).	S.W.	—	—	—	—	1 p.m. (28th).	S.W.	4	11 a.m. (28th).	S.W.	35	—
	2 p.m. (28th).	S.W.b.W.	—	—	—	—	6 p.m. (28th).	S.W.	4	4 p.m. (28th).	S.W.b.W.	34	—

TABLE OF ANTICYCLONIC SYSTEMS.—APRIL—MAY 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. X. April 8-13.	No. XI. April 26-May 8.
Form	Irregular	Irregular generally, but at times oval
Size	Large	Large
Height	Small. Maximum readings 30·37 inches on 11th	Moderate. Maximum readings 30·60 inches on 5th
Where first Observed	Over Finland	Over the North of Norway
Direction of Motion	Westerly	South-westerly
Rate of Motion	Very slow	Very slow
Regions passed over	Sweden and Norway to the North Sea	Norway, the North Sea, and the British Isles
Termination	Became dispersed	Disappeared to the south-west of Ireland
Accompanying Wind	Moderate to strong Easterly winds over the British Isles. Northerly or North-easterly gales were experienced in the Baltic and over Denmark.	Easterly backing to North; then calms and light airs; followed by fresh Easterly winds in the Channel and Westerly winds in the north. Afterwards strong Northerly winds became general.
„ Weather	Unsettled and cold, with a good deal of cloud, rain, and mist, and some snow; improving somewhat on the 11th and 13th.	At first cloudy, but afterwards bright and fine, though cool for the time of the year. Sharp night frosts.
REMARKS	This system appeared over the north-eastern portion of our area before the depression No. XXVIII. had quite passed away, and gradients became in consequence rather steep. On reaching the North Sea the system rapidly broke up upon the approach of depression No. XXIX. towards our southern coasts.	This system gave way upon the approach of depression No. XXXIV. towards our northern coasts. During the last few days of its continuance the barometrical gradients for Northerly winds became rather steep, owing to the existence on the Continent of low-pressure areas, the centre of which, however, kept, as a rule, outside the limits of the area covered by our observations.

TABLE OF ANTICYCLONIC SYSTEMS.—MAY—JUNE 1879.

No. XII. May 20-24.	No. XIII. June 9-15.	No. XIV. June 29-30.
Irregular	Irregular	Oval.
Large	Large	Large.
Small; maximum readings 30·43 inches on 23rd	Small; maximum readings 30·34 inches on 12th	Small; maximum readings 30·25 inches on 29th and 30th.
Over the greater part of continental Europe	Over central Europe	The Peninsula.
Westerly	At first irregular, then easterly	North-easterly.
Very slow	Very slow	Slow.
The whole of western Europe	The greater part of continental Europe	The Peninsula, France, and Germany.
Became dispersed	Disappeared over eastern Russia	Became dispersed over Austria.
At first light Southerly airs; then moderate Westerly to Northerly winds.	Light to moderate, and generally from the Southward.	Moderate to fresh Southerly and South-westerly winds.
Cold and unsettled, with occasional rain at most of our stations.	Occasionally bright; but as a rule cold, dull, rainy, and foggy; with a good deal of thunder during the earlier days.	Moderately fine, but with showers in places, and in some parts of England a good deal of thunder and lightning.
During the first day or two this system stretched as a belt of high readings from the Peninsula to Scandinavia; but on the 22nd the arrival of a shallow depression over Scotland divided it in two, and maximum readings were found both to the south-west of our Islands and also over the north of Sweden. Other shallow disturbances followed, with the result that by the close of the 24th the anticyclone had become dispersed.	This system was confined almost entirely to the Continent, and during its continuance several shallow depressions skirted our coasts, keeping the weather in a very unsettled state. Upon the approach of depression No. XLII., the high-pressure area moved away rapidly to the eastward, beyond the limits of the area embraced by these remarks.	The arrival of a rather deep depression at the close of the 30th caused the dispersion of this system. The anticyclone did not extend to Great Britain, a large area of low pressure existing to the north-westward of our Islands during the whole of the time that the high pressures were observed over the Continent.

NOTES to accompany the ANTICYCLONIC TABLES.

April 1st-7th.—During the whole of this period the highest readings were found over eastern Russia, from whence they moved to the northward, and became developed into the anticyclonic system No. X., which was first observed over the north-eastern portion of our area. On the 4th and 5th a second area of relatively high readings was noticed over the Peninsula and France.

April 14th-25th.—Throughout nearly the whole of this interval the barometer was low all over Europe. Towards its close an area of high pressure appeared over the Peninsula for a couple of days, and then became dispersed; but on the 25th an increase of pressure set in in the north and proved to be the commencement of anticyclonic system No. XI.

May 9th-19th.—At first pressure was low over the whole of Europe, with an area of relatively high readings lying to the westward of Ireland, On the 11th this area moved southwards, and pressure rose over the Peninsula and France, and throughout the remainder of the interval the highest readings were generally reported from Spain or the regions immediately adjoining. The system extended northwards at the close of the period, and formed the anticyclonic system No. XII.

May 25th-June 8th.—At first two areas of relatively high pressure were observed, the one over north-eastern and the other over south-western Europe. The latter, however, soon disappeared, and a day or two later the former moved towards the Black Sea, and afterwards to the Mediterranean, in which region the highest readings were found during the remainder of this interval. On the 8th the area of high pressure moved northwards to central Europe, and became united to another belt of relatively high readings which had appeared in the north, and in this way formed anticyclonic system No. XIII.

June 16th-28th.—The area of highest pressure shifted during the first few days from south-eastern Europe to the Mediterranean and the Peninsula, after which it extended northwards again to central Europe, in which region the highest readings were found throughout the remainder of the period.

SECTION III.

REMARKS FOR APRIL 1879.

(*Tables A. to C., April, with Monthly Wind and Weather Charts.*)

Wind.—Over nearly the whole of the United Kingdom the predominant winds were Northerly and Easterly. At the southern stations the directions were more evenly distributed, and Westerly winds were experienced about as frequently as winds from other points, but everywhere else both Southerly and Westerly winds were very deficient.

The month began with light airs, chiefly from the Westward, which continued for three or four days. A Southerly wind then set in and at first blew generally with moderate or fresh force, but at the western stations it more than once increased to a fresh gale. On the 7th the wind backed to the Eastward over the northern half of the kingdom and freshened in force; while at the same time in the Channel it veered to the Westward, and moderated. The Easterly wind, however, gradually spread southwards and became general over the kingdom, occasionally blowing in places with considerable force, till at the close of the 11th it again fell light and was succeeded by a fresh spell of variable airs. These only lasted a short time, and were followed by moderate to strong Easterly winds, which at some of the Channel stations rose to a strong gale. Their force, however, soon moderated over the greater part of the Kingdom, and the wind backed, so that on the 16th a spell of light Northerly airs and calms commenced. A couple of days later a Southerly breeze sprang up in the west and spread slowly over the kingdom, increasing in force at the western stations until it reached a gale; but on the 20th a similar change took place to that which had occurred a fortnight earlier, and the wind veered to the Westward in the Channel while it backed to the Eastward elsewhere. After this the direction was governed by a shallow depression which crossed the south of England, and it continued Easterly over the greater part of the kingdom for a few days, although at the mouth of the Channel a North-westerly gale was experienced for a short time. After another brief interval of Southerly winds, which at the southern stations veered to South-west and West, the direction shifted on the 27th to East, and then to North-east and North which continued to be the prevailing direction throughout the remainder of the month, the force gradually decreasing till on the 30th calms and light airs had become very common.

Pressure.—The mean pressure was fairly uniform over the kingdom, but abnormal in its distribution, the lowest values being in the south-west and the highest in the north; the extreme difference, between Pembroke and Sumburgh Head, amounting to ·12 inch. The mean values were, however, much below the average for April, the defect over the southern half of England amounting to fully a quarter of an inch. The range of the mercury during the month was considerable, and at the south-western stations it exceeded an inch and a half. The lowest point was reached at all the observatories on the 6th—7th, in connexion with depression No. XXVIII., and the small secondary system which immediately preceded it; the other extreme was reached everywhere on the 29th, at which time an anticyclone covered the kingdom.

Movements of the Depressions.—The depressions experienced this month were not very serious, although, in conjunction with others which kept outside our western coasts, they caused a good deal of unsettled weather over the British Islands. The first which arrived passed up St. George's Channel, and another, after lying for some hours over Brittany, passed over northern France and the English Channel. Only two centres crossed over England, and none were observed over the northern half of Great Britain. Towards the close of the month a depression reached the south-west of Ireland, and thence passed south-eastwards across France, whilst another, which came just within the limits of our area, travelled in a northerly direction over Germany and the Baltic. Anticyclonic systems were observed over the northern portion of our area during the earlier portion of the month, and again towards its close.

Temperature.—The mean temperature for the month was below the average all over the United Kingdom, the values decreasing from about 48° at Scilly to 40° at Sumburgh Head. Over the south-eastern and central counties of England the defect was specially marked, the mean values being from 4° to 6° below the average. The lowest temperatures were registered very generally with the Easterly wind which prevailed about the 13th; but the maxima occurred more irregularly, at a majority of stations about the 26th, but at others in the north quite early in the month. The range of temperature was, however, moderate, and varied from about 20° in the north of Scotland and at the mouth of the Channel, to 30° and upwards over England.

Vapour Tension.—This was greatest in the south-west and along the Channel coast, but was tolerably uniform in its distribution over the greater part of England and Scotland. *Relative Humidity* was, upon the whole, highest in the south and east of England, and least on the west coast of Scotland and at some of the Irish stations.

Rainfall.—In the extreme north the fall of rain was decidedly below the average, while over central and southern England it was rather above it, although the excess was nowhere very great. Large daily falls were not frequent, and a fall of 1·4 inch at Aberbeen on the 7th and of 1·7 inch at Valencia on the 19th, were the two largest daily amounts recorded.

TABLE A., APRIL.—SHOWING the MEAN and EXTREME PRESSURES and TEMPERATURES recorded at each of the SEVEN SELF-RECORDING OBSERVATORIES of the METEOROLOGICAL OFFICE during the Month of APRIL 1879; together with the MONTHLY VAPOUR TENSION, the RELATIVE HUMIDITY, and TOTAL RAINFALL.

NAMES OF OBSERVATORIES.	PRESSURE at 32° F. and the Mean Sea Level (In English Inches).						TEMPERATURE In the Shade (In Degrees Fahrenheit).						HYGROMETRIC VALUES.		RAINFALL (In English Inches).
	Mean for the Month.	Extremes.				Range.	Mean for the Month.	Extremes.				Range.	Tension of Vapour (In English Inches).	Relative Humidity (Saturation = 100).	
		Minimum.		Maximum.				Minimum.		Maximum.					
		Reading.	Date.	Reading.	Date.			Reading.	Date.	Reading.	Date.				
	ins.	ins.	D. H.	ins.	D. H.	ins.	°	°	D. H.	°	D. H.	°	in.	%	ins.
Valencia - -	29·684	28·889	7th, 4 a.m.	30·391	29th, 10 a.m.	1·502	46·5	32·1	13th, 11 a.m.	56·1	24th, 3 p.m.	24·0	0·259	83	5·421
Armagh - -	·714	·957	6th, 3 p.m.	·394	29th, 9 a.m. 11 a.m.	1·437	42·6	30·4	18th, 5 a.m.	56·0	5th, 2 p.m.	25·6	·221	82	2·355
Glasgow - -	·721	28·950	6th, 7 p.m.	·316	29th, 1 a.m.	1·366	41·2	30·3	13th, 2 a.m.	53·6	26th, 4 p.m.	23·3	·205	80	1·589
Aberdeen -	·775	29·141	6th, 11 p.m.	·326	29th, 1 p.m.	1·185	39·4	30·3	19th, 6 a.m.	51·5	4th, 4 p.m.	21·2	·208	87	3·730
Falmouth - -	·693	28·780	7th, 5 a.m.	·399	29th, 1 p.m.	1·619	45·7	32·7	12th, 2 a.m. 13th, 6 a.m.	55·9	20th, 2 p.m. 26th, 1 p.m.	23·2	·249	82	3·410
Stonyhurst - -	·711	·877	7th, Noon.	·355	29th, 9 a.m.	1·478	41·0	28·0	13th, 6 a.m.	56·2	7th, 2 p.m.	28·2	·199	78	1·579
Kew - -	29·696	28·934	7th, 7 a.m.	30·337	29th, 1 p.m.	1·403	43·8	28·9	12th, 1 a.m.	60·0	26th, 2 p.m.	31·1	0·228	79	3·030

TABLE B., April.—Giving a Summary of the Meteorological Observations made at The Values are not

(The Stations are grouped in Districts, and then arranged in order of

Names of Districts.	Names of Stations.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 9 a.m. and 9 p.m.	Air Temperature.									
						Means of			Absolute Extremes.			
			At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.
		ins.	°	°	°	°	°	°	°		°	
0. SCOTLAND, N. -	Sandwick Manse (Orkneys) -	29·792	41·3	38·1	39·7	35·6	44·7	40·2	29·4	16th	52·8	5th
1. SCOTLAND, E. -	Glenalmond - - -	29·769	40·5	37·5	39·0	33·8	45·1	39·5	27·5	13th	56·7	26th
2. ENGLAND, N.E. -	Seaham - - - -	29·733	42·3	39·7	41·0	35·2	46·1	40·7	26·6	13th	58·4	1st
	Durham* - - -	29·729	42·6	37·7	40·2	34·2	47·9	41·1	27·4	13th	57·2	26th
	Hull - - - -	29·739	42·7	40·3	41·5	35·8	50·7	43·3	29·0	13th	61·0	3rd
	Kelstern 𝔐 - - -	29·731	41·0	38·4	39·7	34·8	47·1	41·0	28·5	13th	58·1	26th
3. ENGLAND, E. -	Hillington 𝔐 - - -	29·709	43·9	39·3	41·6	35·1	50·6	42·9	26·8	12th	61·5	27th
	Audley End 𝔐 (Saffron Walden).	29·701	43·4	39·7	41·6	35·0	50·0	42·5	25·0	12th	59·0	7th, 26th
	Chigwell Row - - -	29·732	43·7	41·2	42·5	36·2	49·9	43·1	27·2	12th	59·0	26th
4. MIDLAND COUNTIES.	Wakefield 𝔐 - - -	29·723	42·1	41·1	41·6	35·6	48·9	42·3	29·0	13th	57·3	26th
	Buxton 𝔐 - - -	29·747	39·4	36·8	38·1	31·8	46·0	38·9	19·9	13th	53·2	26th
	Cheadle 𝔐 - - -	29·715	40·0	39·2	39·6	34·1	47·6	40·9	24·9	13th	55·9	7th
	Leicester - - -	29·703	43·6	41·7	42·7	36·0	49·0	42·5	28·5	22nd	57·9	26th
	Uppingham - - -	29·706	42·7	39·4	41·1	34·6	49·2	41·9	26·9	12th	57·2	26th
	Oscott - - - -	29·708	41·5	40·2	40·9	35·0	48·1	41·6	26·5	13th	56·9	26th
	Churchstoke 𝔐 - -	29·732	40·8	39·8	40·3	34·0	47·4	40·7	22·8	13th	55·1	4th
	Cheltenham 𝔐 - -	29·703	43·8	41·6	42·7	34·9	49·5	42·2	26·5	4th	56·2	27th
5. ENGLAND, S. -	Marlborough 𝔐 - -	29·719	43·1	40·3	41·7	35·1	50·4	42·8	27·2	12th	58·5	27th
	Strathfield Turgiss 𝔐 -	29·706	45·7	41·8	43·8	35·4	51·9	43·7	25·0	12th	60·9	26th
	Ramsgate 𝔐 - - -	29·721	45·3	42·3	43·8	38·9	50·7	44·8	31·7	12th	59·5	15th
	Folkestone - - -	29·701	44·8	41·6	43·2	38·3	49·3	43·8	29·0	12th	57·5	27th
	Southampton - -	29·696	44·3	42·7	43·5	37·8	50·1	44·0	28·6	12th	57·4	27th
	Hastings - - -	29·704	44·6	42·0	43·3	38·6	49·2	43·9	27·1	12th	57·3	27th
6. SCOTLAND, W. -	Laudale - - -	29·729	43·5	42·4	43·0	36·2	49·3	42·8	31·0	14th, 17th	55·1	26th
7. ENGLAND, N.W.	Douglas (Isle of Man) -	29·702	43·0	40·8	41·9	36·6	46·9	41·8	30·7	13th	52·0	28th
	Llandudno 𝔐 - - -	29·692	44·5	42·4	43·5	37·8	48·0	42·9	30·0	13th	55·7	19th, 25th
8. ENGLAND, S.W. -	St. David's (Pembroke) -	29·679	44·7	42·5	43·6	39·4	49·6	44·5	28·3	13th	56·8	24th
	Caermarthen 𝔐 - -	29·683	44·5	41·7	43·1	37·1	51·4	44·3	26·2	12th	59·2	27th
	Dartmoor 𝔐 - - -	29·687	40·7	37·8	39·3	33·7	46·0	39·9	25·0	13th, 14th	54·2	27th
	Babbacombe 𝔐 - -	29·692	45·4	42·2	43·8	38·3	51·1	44·7	30·8	12th, 13th	57·9	8th
9. IRELAND, N. -	Londonderry - - -	29·728	44·1	42·1	43·1	38·2	48·9	43·6	30·8	18th	56·0	25th
	Brookborough - - -	29·682	41·9	40·8	41·4	35·2	49·6	42·4	25·3	3rd	57·2	6th
	Markree Castle - -	—	44·9	41·2	43·1	35·5	51·1	43·3	25·1	3rd	58·5	25th
10. IRELAND, S. -	Dublin - - - -	29·707	44·4	43·6	44·0	39·8	49·2	44·5	31·2	3rd	59·6	25th
	Parsonstown - - -	29·699	45·4	42·2	43·8	36·7	52·1	44·4	26·0	17th	60·5	24th
CHANNEL -	Jersey (St. Aubin's) - -	29·720	48·5	44·6	46·6	41·4	52·5	47·0	35·0	12th	58·1	20th

Note.—The stations marked thus 𝔐 are in connection with the Royal Meteorological Society.

* At Durham the observations were taken at 10 a.m. and 10 p.m. each day.

STATIONS of the SECOND ORDER in the BRITISH ISLANDS, during the Month of APRIL 1879.
corrected for Diurnal Range.
Latitude, beginning in each case with the Station lying furthest North.)

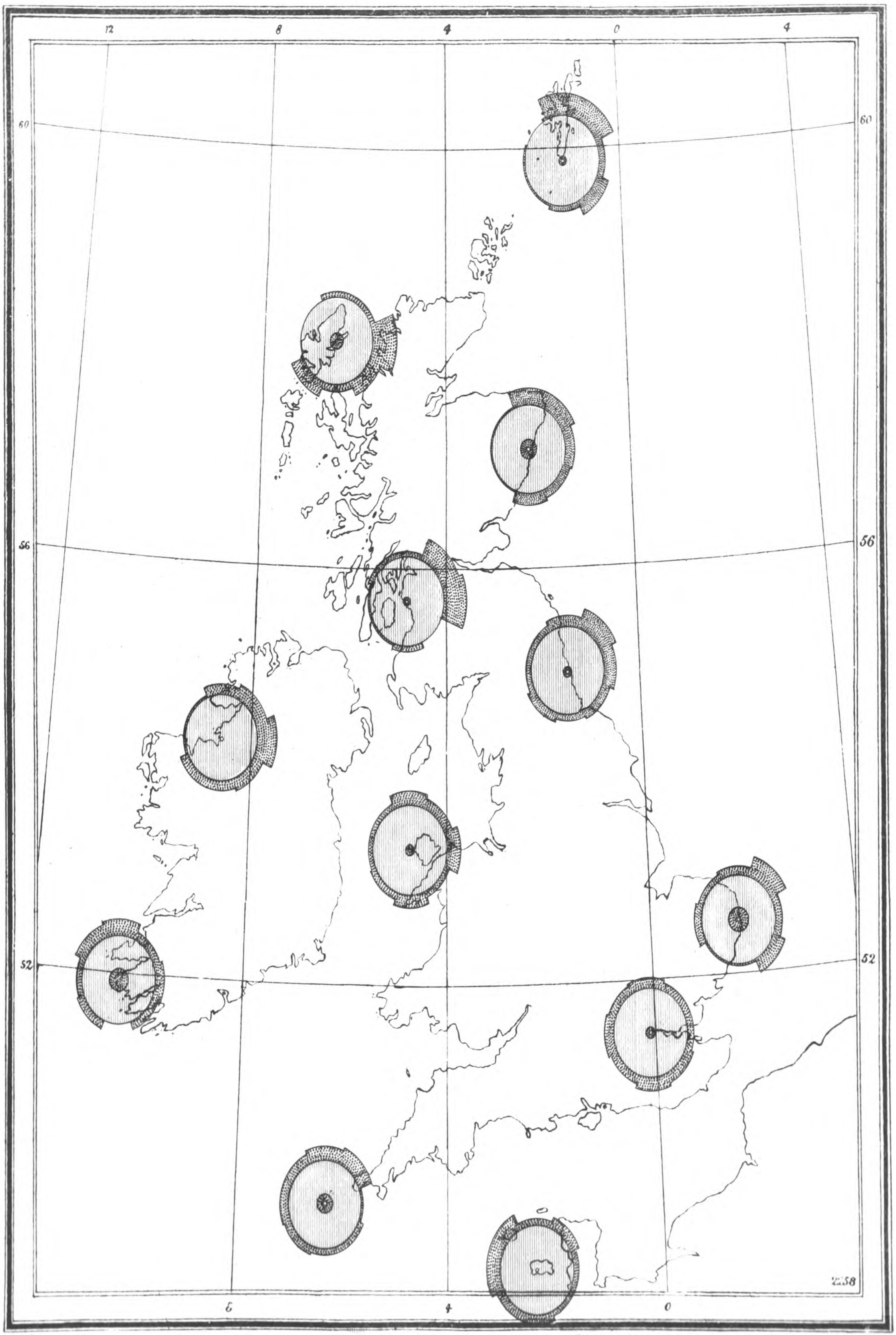
TENSION OF VAPOUR.			RELATIVE HUMIDITY.			AMOUNT OF CLOUD (0 to 10).			RAINFALL.			WEATHER. No. of Days of							WIND. No. of Observations of								
At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
in.	in.	in.	%	%	%				ins.	ins.																	
0·209	0·205	0·207	81	89	85	6·9	6·2	6·6	1·700	0·610	7th	15	2	2	0	4	11	4	5	12	10	11	4	5	1	2	10
·201	·200	·201	80	88	84	8·0	8·0	8·0	2·650	·675	8th	14	4	3	1	0	16	0	1	9	24	5	3	6	5	2	5
·228	·228	·228	85	93	89	7·7	7·8	7·8	2·070	·358	7th	18	6	0	0	1	17	0	11	10	10	5	5	3	3	1	12
·221	·209	·215	81	91	86	8·6	7·5	8·1	1·877	·288	23rd	20	6	3	2	0	18	0	9	20	9	1	7	4	4	3	3
·230	·225	·228	84	91	88	8·1	7·7	7·9	1·140	·180	8th	18	0	0	1	0	15	0	6	10	11	5	5	7	3	1	12
·224	·214	·219	87	91	89	8·6	6·7	7·7	2·728	·800	9th	20	4	0	1	0	14	0	5	13	13	7	8	2	2	9	1
·249	·221	·235	86	90	88	8·3	8·4	8·4	2·546	·405	8th	17	6	1	1	0	20	0	3	19	6	13	3	9	0	7	0
·241	·225	·233	85	91	88	8·3	6·5	7·4	2·730	·720	12th	20	8	1	3	0	15	0	1	14	1	12	5	9	1	16	1
·242	·229	·236	85	89	87	8·5	6·6	7·6	2·770	·410	12th	17	5	0	1	0	12	0	10	11	5	9	8	7	2	5	3
·231	·230	·231	86	88	87	8·5	6·5	7·5	2·780	·650	23rd	19	2	0	1	0	11	0	10	16	13	4	6	2	3	6	0
·206	·196	·201	85	89	87	8·1	6·0	7·1	3·160	·410	20th	19	5	0	0	0	9	0	2	4	16	12	3	8	4	8	3
·214	·204	·209	87	85	86	8·0	5·1	6·6	2·860	·760	23rd	16	5	2	2	1	10	4	5	17	6	6	8	3	2	6	7
·220	·219	·220	78	84	81	8·3	6·4	7·4	2·110	·490	14th	18	6	0	0	1	15	0	2	22	4	2	5	12	1	6	6
·236	·217	·227	85	89	87	8·3	6·9	7·6	3·085	·596	23rd	16	6	0	0	0	17	0	8	16	9	6	5	8	3	2	3
·226	·219	·223	85	87	86	8·7	5·9	7·3	2·780	·610	23rd	18	5	2	0	1	14	1	8	16	9	3	8	6	1	4	5
·223	·218	·221	87	88	87	7·7	6·8	7·3	1·599	·215	6th	22	5	3	1	0	9	0	15	7	9	3	10	7	3	6	0
·244	·239	·242	85	90	88	8·3	7·0	7·7	2·590	·580	6th	20	3	2	3	1	15	1	12	3	4	10	9	7	7	7	1
·236	·227	·232	85	89	87	8·1	5·7	6·9	3·390	·690	6th	16	2	0	1	2	12	0	5	9	1	2	0	8	4	0	31
·246	·229	·238	80	85	83	8·0	7·1	7·6	3·310	·931	30th	18	3	1	2	1	15	0	9	9	1	7	4	8	10	12	0
·253	·240	·247	83	88	86	7·1	6·5	6·8	3·000	·580	16th	19	3	1	1	2	13	0	9	11	3	7	5	7	6	4	8
·251	·243	·247	84	91	88	7·8	7·7	7·8	2·840	·610	12th	17	2	3	2	1	18	6	13	8	12	5	7	4	3	7	1
·257	·253	·255	87	92	89	8·3	6·1	7·2	3·011	·755	6th	16	2	2	1	1	14	0	5	16	3	8	6	9	4	9	0
·250	·241	·246	84	90	87	7·6	6·6	7·1	3·425	·920	15th	19	3	1	1	0	13	2	9	15	2	1	15	4	5	3	6
·218	·216	·217	77	80	78	5·1	5·3	5·2	2·250	·740	6th	9	4	3	0	5	6	0	4	4	28	4	4	2	4	2	8
·231	·221	·226	83	86	85	7·7	6·1	6·9	2·259	·685	20th	13	4	4	0	1	11	0	2	16	18	4	1	4	5	1	9
·241	·232	·237	82	85	84	7·5	5·6	6·6	1·490	·440	20th	14	2	1	0	4	11	0	9	4	21	3	5	7	6	5	0
·249	·250	·250	83	91	87	7·0	5·4	6·2	2·100	·570	7th	15	1	1	0	1	10	2	4	15	8	8	1	9	4	7	4
·242	·233	·238	82	87	85	7·8	6·2	7·0	2·470	0·550	5th	20	2	2	1	2	13	1	10	5	15	4	7	7	4	1	7
·224	·216	·220	87	94	90	6·1	3·9	5·0	5·240	1·020	18th	21	4	0	1	2	4	0	6	17	2	3	4	9	9	9	1
·249	·237	·243	82	88	85	6·7	5·4	6·1	4·160	0·650	6th	21	4	1	1	3	10	2	8	14	5	2	7	6	9	6	3
·233	·232	·233	81	86	83	7·5	6·3	6·9	1·500	·240	7th	18	2	6	1	0	13	0	2	15	9	6	2	8	2	1	15
·228	·210	·219	87	83	85	8·5	7·2	7·9	1·686	·272	23rd	12	—	—	—	1	18	4	3	24	4	2	1	2	2	3	19
·234	·219	·227	78	84	81	7·3	6·6	7·0	1·252	·288	23rd	19	1	1	0	1	10	0	5	8	12	3	4	4	1	5	18
·241	·238	·240	82	84	83	7·2	6·5	6·9	1·997	·321	7th	17	4	6	1	3	15	1	6	12	9	8	2	5	8	6	4
·244	·233	·239	80	86	83	7·1	6·8	7·0	2·241	·665	5th	19	1	1	0	2	12	0	6	6	2	7	7	6	3	8	15
·266	·257	·262	78	86	82	6·3	5·3	5·8	2·054	·433	6th	15	1	2	0	3	9	1	8	11	3	7	5	11	5	9	1

TABLE C., APRIL.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at TELEGRAPHIC REPORTING STATIONS in the BRITISH ISLANDS, during the Month of APRIL 1879. Observations are made at 8 a.m. daily.

(The Stations are grouped in Districts, and then arranged in order of Latitude, beginning in each case with the Station lying furthest North.)

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 8 a.m.	AIR TEMPERATURE. At 8 a.m.	Means of Minima.	Means of Maxima.	Means of Min. and Max. combined.	Absolute Extremes. Minimum.	Date.	Maximum.	Date.	TENSION OF VAPOUR.	RELATIVE HUMIDITY.	AMOUNT OF CLOUD.	RAINFALL. Total Fall in the Month.	Maximum Fall in One Day.	Date.	WEATHER. No. of Days of Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	WIND. No. of Observations of North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
		ins.	°	°	°	°	°		°		in.	%		ins.	ins.																	
0. SCOTLAND, N.	Sumburgh Head	29·787	40·3	34·9	43·9	39·4	30	13th, 24th	49	5th	0·215	87	6·2	0·73	0·31	4th	15	1	0	0	6	8	3	9	9	2	5	2	1	1	0	1
	Wick	29·764	40·6	35·2	47·0	41·1	29	18th, 20th	52	1st, 5th	·208	83	6·4	1·31	0·35	7th	18	0	0	0	5	12	1	1	6	6	7	3	2	0	4	1
	Stornoway	29·720	41·1	36·0	45·2	40·6	30	15th, 17th	50	4th	·212	82	4·9	1·16	0·32	15th	13	1	0	0	12	9	2	2	2	12	5	2	5	0	0	2
1. SCOTLAND, E.	Nairn	29·751	39·4	36·3	47·0	41·7	29	13th	53	5th	·205	85	5·6	1·23	0·55	16th	14	4	1	0	12	13	1	1	1	10	3	0	2	2	1	10
	Aberdeen	29·753	39·7	36·6	45·3	41·0	30	19th	55	4th	·208	85	6·7	3·86	1·41	7th	18	5	2	0	6	13	2	6	6	4	3	5	1	1	1	3
	Leith	29·732	40·6	36·1	47·4	41·8	30	13th, 14th, 19th.	54	1st, 4th	·221	88	6·9	1·72	0·44	7th	13	3	1	0	2	10	0	1	6	12	2	1	3	4	1	0
2. ENGLAND, N.E.	Shields	29·731	40·4	36·4	44·9	40·7	30	13th	54	1st, 4th	·211	84	8·0	2·26	0·56	7th	17	6	3	0	2	18	0	4	8	5	3	2	3	2	2	1
	Scarborough	29·725	40·4	37·9	44·6	41·3	31	12th	56	25th	·224	90	8·1	1·89	0·30	26th	20	1	1	0	3	20	0	7	6	4	4	2	3	1	1	2
	York	29·721	40·5	35·6	50·2	42·9	27	13th	60	26th	·222	89	7·7	1·69	0·31	8th	20	0	0	1	5	19	0	6	7	4	2	5	0	5	1	0
3. ENGLAND, E.	Yarmouth	29·699	40·6	36·7	44·6	40·7	31	19th	54	26th	·227	90	6·6	2·26	0·34	9th	22	5	1	0	4	9	1	3	8	3	5	1	1	3	2	4
	Cambridge	29·691	42·2	35·4	52·3	43·9	26	12th	62	27th	·243	90	7·7	2·32	0·59	12th	21	3	2	2	6	19	0	8	4	2	3	6	1	2	4	0
4. MIDLAND COUNTIES.	Nottingham	29·710	41·0	35·1	51·2	43·2	27	4th, 12th	60	7th, 25th 26th.	·217	85	8·3	2·57	0·63	9th	15	5	0	1	4	22	0	6	5	2	4	4	4	1	4	0
	Oxford	29·677	40·9	36·2	48·8	42·7	27	19th	58	26th	·226	89	7·9	2·38	0·44	23rd	19	4	1	1	3	18	0	6	5	4	0	3	3	3	0	6
5. ENGLAND, S.	London	29·686	42·5	37·2	51·9	44·6	29	12th, 19th	62	26th	·237	87	7·6	2·76	0·47	9th	21	4	3	0	3	16	0	4	3	3	4	5	3	4	3	1
	Dover	29·680	43·8	40·3	48·0	44·2	31	12th	54	27th	·240	84	5·7	2·49	0·48	14th	20	2	1	0	5	7	0	9	4	4	2	2	5	3	1	0
	Hurst Castle	29·672	42·5	39·2	48·8	44·0	29	12th	55	24th, 29th	·255	94	6·8	2·43	0·68	6th	15	5	0	1	7	13	1	3	7	3	3	2	4	3	4	1
6. SCOTLAND, W.	Ardrossan	29·713	41·6	37·9	49·5	43·7	31	13th, 18th	56	18th, 21st, 26th.	·210	80	7·3	1·34	0·47	25th	17	2	0	0	3	16	1	2	9	12	0	2	1	1	2	1
7. ENGLAND, N.W.	Liverpool	29·691	41·8	37·9	48·6	43·3	30	13th, 14th	55	7th, 26th	·225	85	8·1	1·76	0·29	9th	14	2	0	0	3	19	0	1	8	8	4	3	1	2	1	2
	Holyhead	29·682	43·4	40·3	48·3	44·3	34	13th	57	19th	·241	85	7·3	1·39	0·20	7th	15	2	0	0	5	15	1	5	4	6	2	5	3	2	2	1
8. ENGLAND, S.W.	Pembroke	29·659	43·2	39·9	47·4	43·7	30	13th	54	27th	·245	87	6·5	1·82	0·50	7th	13	1	0	0	7	15	4	1	6	3	4	3	4	3	5	1
	Prawle Point	29·693	43·6	38·5	49·6	44·1	30	12th, 13th	56	21st, 24th	·256	90	7·2	4·10	0·76	14th	21	1	0	0	3	11	2	5	7	1	1	3	5	2	4	2
9. IRELAND, N.	Donaghadee	29·717	41·5	37·9	47·4	42·7	32	13th	52	4th, 30th	·236	90	6·2	1·85	0·35	7th	15	1	0	0	8	13	0	3	8	6	4	3	3	2	1	0
	Mullaghmore	29·676	42·8	39·6	48·6	44·1	33	13th	56	25th	·238	87	7·1	1·57	0·30	8th	18	1	2	0	5	11	6	4	5	9	4	3	3	1	1	0
10. IRELAND, S.	Kingstown	29·688	42·9	39·4	48·6	44·0	31	13th, 14th	62	25th	·233	84	7·2	2·03	0·34	7th	22	1	3	1	4	13	1	3	3	3	6	3	0	4	5	3
	Valencia	29·687	46·3	39·9	52·5	46·2	30	14th	57	24th, 25th, 29th.	·253	81	6·1	5·40	1·73	19th	20	1	0	0	5	10	4	6	3	4	3	0	3	2	5	4
	Roche's Point	29·673	44·4	40·8	52·1	46·5	32	13th	59	24th	·234	80	4·9	4·38	0·90	19th	18	2	1	1	7	5	2	11	5	1	0	3	3	3	4	0
CHANNEL ISLANDS	Scilly	29·674	47·6	43·9	51·1	47·5	35	13th, 14th	57	20th, 21st	·279	85	7·8	2·67	0·60	19th	18	1	1	0	0	14	6	5	6	1	2	2	3	4	4	3
	Jersey	29·709	45·7	41·6	50·5	46·1	35	12th, 14th	55	7th, 20th	·266	87	6·2	2·19	0·53	6th	17	2	0	1	8	4	4	2	4	2	2	4	4	6	6	0

MONTHLY WIND CHART FOR APRIL, 1879.

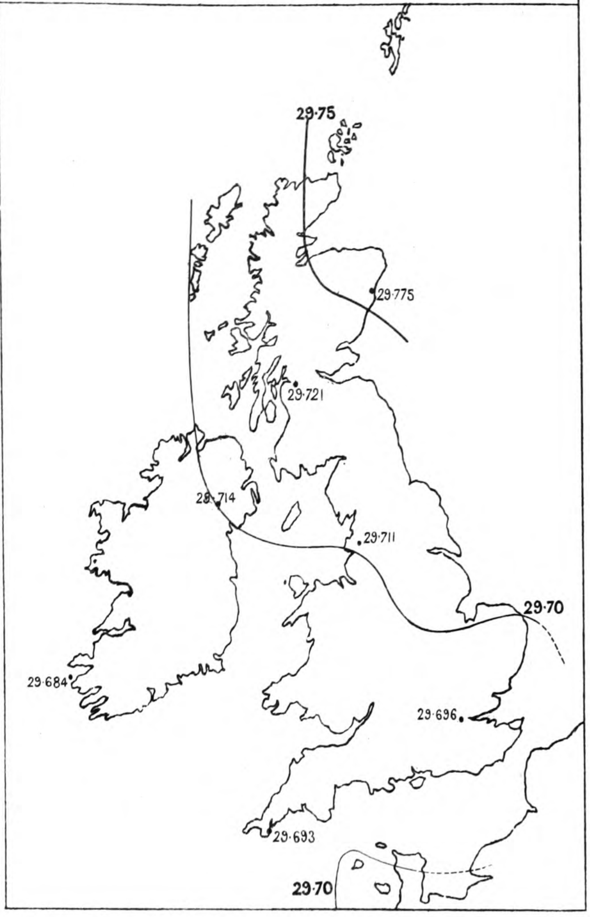

12
8
4
0
4
60
60
56
56
52
52
258
8
4
0

To face p. 66.

DANGERFIELD, LITH. 22, BEDFORD ST. COVENT GARDEN. 14518.

MONTHLY WEATHER CHART, APRIL, 1879.

1. DISTRIBUTION OF MEAN PRESSURE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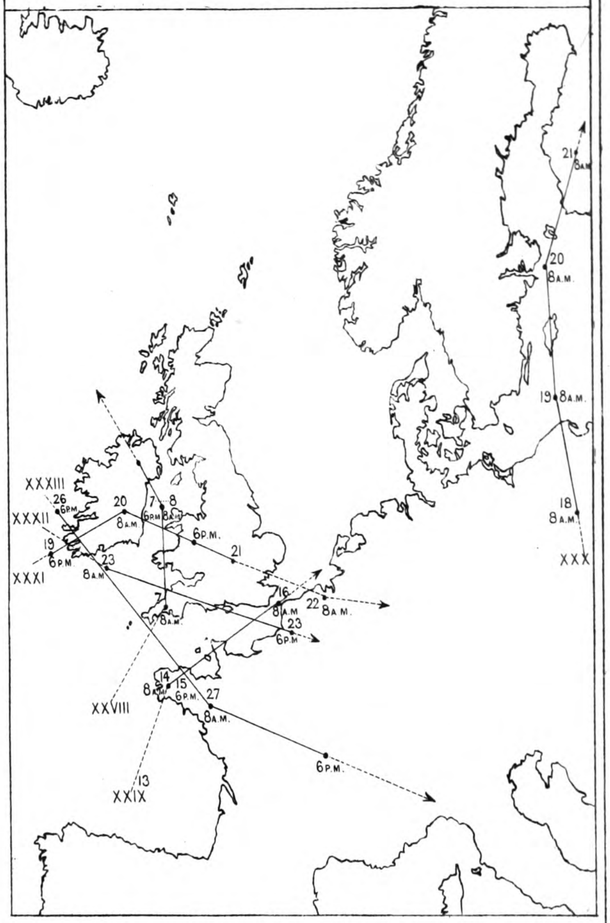
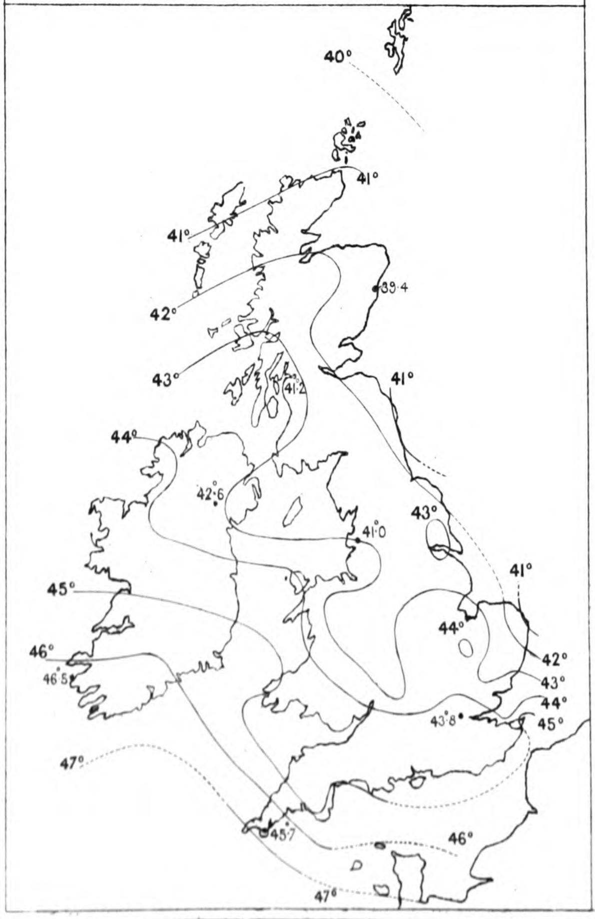
29·775
29·721
28·714
29·711
29·70
29·684
29·696
29·693
29·70

2. MOVEMENTS OF DEPRESSIONS.


XXXIII
26 6P.M.
XXXII
19 6P.M.
XXXI
20 8A.M.
7 6P.M.
8 8A.M.
6P.M.
21
23 8A.M.
7 8A.M.
16 8A.M.
22 8A.M.
23 6P.M.
14 8A.M.
15 6P.M.
27 8A.M.
6P.M.
XXVIII
13
XXIX
21 8A.M.
20 8A.M.
19 8A.M.
18 8A.M.
XXX

3. DISTRIBUTION OF MEAN TEMPERATURE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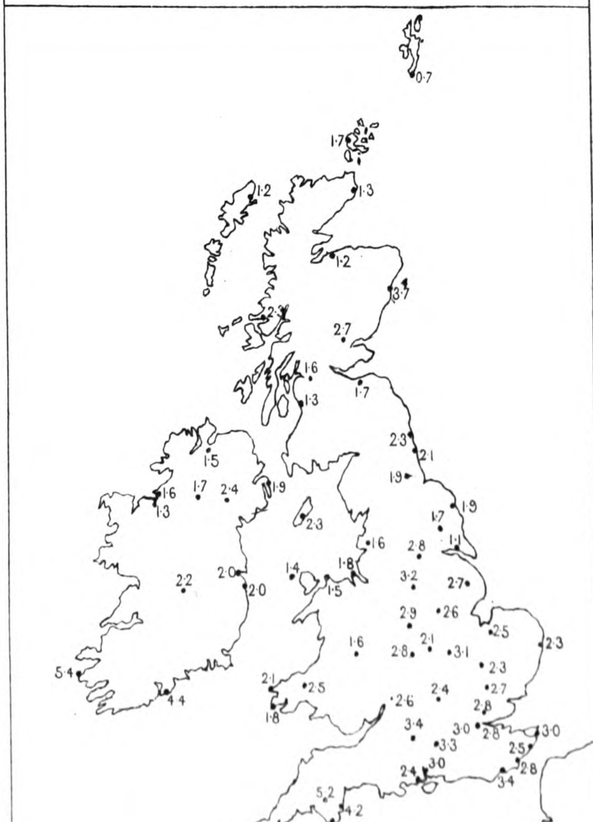
41°
41°
42°
39·4
43°
41·2
41°
44°
42·6
41·0
43°
41°
45°
44°
46°
46·5
42°
43°
44°
45°
43·8
47°
45·7
46°
47°

4. RAINFALL


0·7
1·7
1·2
1·3
1·2
3·7
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2·7
1·6
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1·9
1·5
1·6
1·3
1·7
2·4
1·9
1·7
1·9
2·3
1·1
1·6
2·8
2·2
2·0
2·0
1·4
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1·5
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2·9
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2·1
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3·1
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4·4
2·1
2·5
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2·4
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2·8
3·0
3·3
2·5
2·8
2·4
3·0
3·4
5·2
4·2
4·1
3·4
2·7
2·1

To follow Wind Chart for April

DANGERFIELD LITH. 22, BEDFORD ST. COVENT GARDEN. 14518.

REMARKS FOR MAY 1879.

(*Tables A. to C., May, with Monthly Wind and Weather Charts.*)

Wind.—The monthly wind chart shows that upon the whole the wind directions were more uniformly distributed during the month than was the case in the month preceding, although at some stations certain winds were still rarely felt; there was, however, nowhere any very marked predominance of wind from any special quarter.

The month began with light anticyclonic airs, chiefly from the Eastward, which at the southern stations soon freshened to a moderate breeze. A South-westerly wind appeared in the north of Scotland on the 3rd, and during the next few days spread southwards, at the same time veering and gradually freshening in force, till on the morning of the 6th a fresh or strong Northerly wind blew generally, and in places attained the strength of a gale. No change of importance occurred till the 8th, when the wind temporarily backed to North-west and West, and moderated; becoming generally Northerly again, however, on the following day. On the 10th another and more permanent retrograde movement set in, and Westerly winds, which were generally light in force, blew for some days; but on the 14th the wind veered again to the Northward and freshened considerably, in the rear of a depression which had crossed over England. Two days later it again backed on the approach of another depression, and for a few hours a Southerly wind blew, veering afterwards to North-west and North in the south-west of England and in Ireland, while it backed to the Eastward elsewhere. A spell of variable airs, mainly from the Southward, ensued, but on the 22nd these became Westerly, and a little later Northerly, and freshened. On the 23rd the direction backed again, and for some days the wind blew mainly from the Westward, till on the 27th it veered once more, and in a few hours became Easterly again. It then fell light, and the direction became variable over the greater part of the kingdom; but in the south of England a Southerly wind sprang up, which gradually veered to West, and continued to blow from that quarter till the close of the month, while further north it veered still more, so that over Scotland a moderate Northerly breeze was experienced.

Pressure.—The mean pressure for the month varied from about 30·1 inches in the south-west of Ireland to about 29·95 inches in the north of Scotland, and 29·92 inches in the Shetlands, so that it was everywhere slightly above the average. The range of the mercury was slight, the lowest point reached being only 29·41 inches (at Falmouth), and the highest 30·62 inches (at Armagh), while at any one station the greatest range was only about an inch and a tenth. The maxima were in all cases recorded on the 4th or 5th, in connexion with anticyclonic system No. XI., while the minima occurred during the unsettled weather experienced at the close of the month.

Movements of the Depressions.—All the depressions experienced during the month were shallow and unimportant. One of them, after travelling quickly across England, lay for several hours off our east coast, and another passed very slowly across south-western England towards the Straits of Dover. Two others, however, followed unusual tracks; one, after remaining for some hours over Brittany, moving away to the north-west, and skirting our south-western coasts, while the other moved in a somewhat similar direction, but across Sweden to the North Sea. An anticyclone lay over Great Britain during the earlier days of the month, and a second high-pressure system was experienced during the latter half of the month.

Temperature.—Temperature was again everywhere below the average, the mean values ranging from 51° in the south-west to 44° in the extreme north of the British Isles. The maximum temperatures were generally low, and the rather large range which was experienced at several stations was mainly due to the low minima which were recorded. At Buxton the thermometer fell to 23°; at Cheltenham to 23°·4; at Strathfield Turgiss to 23°·6; and at Nottingham and Audley End to 25°. On the other hand 70° was reached only at Durham and Hillington, while at some Midland stations the highest point but little exceeded 60°. The range of temperature varied from 18° at Scilly, and 24° in the Orkneys and at one or two stations on the Irish coasts, to about 45° at two or three places in the Midlands and south of England; at the great majority of places, however, it varied between 30° and 40°.

Vapour Tension.—The mean values were higher than they were in the preceding month, and, upon the whole, they were pretty uniformly distributed over the kingdom. The highest values, 0·3 inch, were obtained in the extreme south-west, and the lowest, 0·24 inch, over Scotland. *Relative Humidity* was not very uniform in its distribution; but on the whole it was greatest in the north of Scotland, on the east coast of England, and at the stations on the Welsh side of St. George's Channel.

Rainfall.—The fall of rain exceeded the average fall for the month over nearly the whole of England, while in Ireland and Scotland the amounts registered were nearly normal, and indeed in many instances less than the average. Some tolerably heavy falls were registered, in most cases near the end of the month, and over an inch in 24 hours was measured at several stations in the south of England and the Midland Counties.

TABLE A., MAY.—SHOWING the MEAN and EXTREME PRESSURES and TEMPERATURES recorded at each of the SEVEN SELF-RECORDING OBSERVATORIES of the METEOROLOGICAL OFFICE during the Month of MAY 1879, together with the MONTHLY VAPOUR TENSION, the RELATIVE HUMIDITY, and TOTAL RAINFALL.

NAMES OF OBSERVATORIES.	PRESSURE at 32° F. and the Mean Sea Level (In English Inches).						TEMPERATURE In the Shade (In Degrees Fahrenheit).						HYGROMETRIC VALUES.		RAINFALL (In English Inches).
	Mean for the Month.	Extremes.				Range.	Mean for the Month.	Extremes.				Range.	Tension of Vapour (In English Inches).	Relative Humidity (Saturation = 100).	
		Minimum.		Maximum.				Minimum.		Maximum.					
		Reading.	Date.	Reading.	Date.			Reading.	Date.	Reading.	Date.				
	ins.	ins.	D. H.	ins.	D. H.	ins.	°	°	D. H.	°	D. H.	°	in.	%	ins.
Valencia - -	30·095	29·630	29th, 6 p.m. 7 p.m.	30·610	4th, Midt.	0·980	50·0	37·9	10th, 5 a.m.	59·1	31st, 2 p.m.	21·2	0·282	79	2·943
Armagh - -	30·046	·580	26th, 6 a.m.	·619	5th, 1 a.m.	1·039	47·6	32·6	3rd, 5 a.m.	60·8	29th, 1 p.m.	28·2	·261	80	3·610
Glasgow - -	29·984	·481	26th, 1 p.m.	·525	4th, 10 p.m. 11 p.m.	1·044	47·0	31·2	2nd, 5 a.m.	60·7	28th, 4 p.m.	29·5	·235	74	2·611
Aberdeen - -	29·984	·507	26th, 4 p.m.	·493	4th, 9 p.m.	0·986	44·6*	31·7	7th, 2 a.m.	62·8	5th, Noon	31·1	·237	80	3·045
Falmouth - -	30·053	·411	28th, 4 a.m.	·539	5th, 8 a.m.	1·128	49·4	37·0	2nd, 2 a.m.	59·4	21st, 3 p.m.	22·4	·276	78	2·175
Stonyhurst -	30·008	·534	31st, Midt.	·548	5th, 1 a.m.	1·014	47·1	31·0	10th, 4 a.m.	61·3	21st, 3 p.m.	30·3	·244	76	2·344
Kew - -	30·011	29·543	28th, 1 a.m.	30·528	4th, 8 a.m.	0·985	48·7	31·2	10th, 4 a.m.	66·0	21st, 6 p.m.	34·8	0·259	76	3·945

* Mean for one day is approximate.

TABLE B., MAY.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at
The values are not

(The Stations are grouped in Districts, and then arranged in order of

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 9 a.m. and 9 p.m.	AIR TEMPERATURE.									
			At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Means of			Absolute Extremes.			
						Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.
		ins.	°	°	°	°	°	°	°		°	
0. SCOTLAND, N.	Sandwick Manse (Orkneys)	29·945	45·6	42·9	44·3	39·5	49·5	44·5	30·7	9th	55·2	24th
1. SCOTLAND, E.	Glenalmond	30·000	46·8	43·2	45·0	36·6	53·2	44·9	27·5	2nd	63·0	11th
2. ENGLAND, N.E.	Seaham	29·992	47·7	43·8	45·8	39·2	52·8	46·0	31·8	10th	66·1	30th
	Durham*	29·983	49·3	42·2	45·8	37·7	55·1	46·4	28·9	3rd	70·1	5th
	Hull	30·012	48·5	45·6	47·1	39·0	56·4	47·7	29·5	5th, 6th	66·2	21st
	Kelstern 𝔐	30·014	47·3	43·3	45·3	38·1	54·0	46·1	28·7	10th	66·5	21st
3. ENGLAND, E.	Hillington 𝔐	29·997	50·8	44·9	47·9	38·8	57·2	48·0	25·9	4th	70·4	21st
	Audley End 𝔐 (Saffron Walden).	30·003	49·2	44·5	46·9	38·3	55·8	47·1	25·0	10th	66·0	21st
	Chigwell Row	30·041	50·0	46·2	48·1	40·4	55·7	48·1	29·0	10th	65·0	5th, 24th
4. MIDLAND COUNTIES.	Wakefield 𝔐	30·008	48·4	47·3	47·9	39·5	55·6	47·6	27·0	3rd	64·8	21st
	Buxton 𝔐	30·033	46·7	42·4	44·6	37·0	53·0	45·0	23·0	10th	63·1	21st
	Cheadle 𝔐	30·020	46·0	45·0	45·5	39·2	53·2	46·2	28·0	10th	61·2	21st
	Leicester	30·011	48·9	47·8	48·4	40·2	55·7	48·0	26·8	10th	67·3	21st
	Uppingham	30·009	48·1	44·8	46·5	38·9	55·2	47·1	28·1	10th	67·2	5th
	Oscott	30·012	47·6	46·2	46·9	40·0	55·1	47·6	28·6	10th	67·1	21st
	Churchstoke 𝔐	30·044	47·8	45·8	46·8	38·7	54·7	46·7	28·0	3rd	63·1	5th
	Cheltenham 𝔐	30·015	49·4	47·1	48·3	39·2	56·8	48·0	23·4	10th	68·0	21st
5. ENGLAND, S.	Marlborough 𝔐	30·034	48·7	46·3	47·5	40·0	57·0	48·5	27·6	10th	66·3	20th, 21st
	Strathfield Turgiss 𝔐	30·023	50·4	46·8	48·6	39·2	57·8	48·5	23·6	3rd	69·0	24th
	Ramsgate 𝔐	30·030	50·9	46·0	48·5	42·0	57·3	49·7	34·6	1st	68·4	21st
	Folkestone	30·010	50·0	45·1	47·6	40·5	54·7	47·6	30·5	1st	65·4	19th
	Southampton	30·016	50·1	47·3	48·7	42·4	56·6	49·5	32·2	8th, 10th	66·4	5th
	Hastings	30·017	49·4	45·8	47·6	41·5	54·3	47·9	30·9	10th	64·8	22nd
6. SCOTLAND, W.	Laudale	29·989	48·6	46·5	47·6	40·4	54·2	47·3	31·4	10th	60·0	31st
7. ENGLAND, N.W.	Douglas (Isle of Man)	30·016	49·0	45·1	47·1	40·2	53·5	46·9	29·0	8th	60·6	29th
	Llandudno 𝔐	30·030	49·6	47·5	48·6	43·1	53·8	48·5	32·6	2nd	59·8	3rd
8. ENGLAND, S.W.	St. David's (Pembroke)	30·038	48·6	46·3	47·5	42·8	53·0	47·9	32·3	2nd	59·3	31st
	Caermarthen 𝔐	30·026	50·8	46·3	48·6	41·6	56·2	48·9	29·4	3rd	65·8	19th
	Dartmoor 𝔐	30·045	44·2	42·1	43·2	38·3	49·1	43·7	27·5	8th	59·0	5th
	Babbacombe 𝔐	30·030	49·6	46·9	48·3	43·1	55·3	49·2	35·0	2nd, 8th	63·0	22nd
9. IRELAND, N.	Londonderry	30·045	49·9	46·8	48·4	41·9	54·4	48·2	34·0	2nd	61·0	21st
	Brookborough	30·022	48·4	46·0	47·2	38·9	55·0	47·0	27·3	2nd	63·0	29th
	Markree Castle	—	50·1	45·9	48·0	39·1	54·8	47·0	26·0	2nd	61·2	21st
10. IRELAND, S.	Dublin	30·057	50·2	48·5	49·4	42·1	55·4	48·8	31·8	10th	63·0	31st
	Parsonstown	30·071	50·6	46·9	48·8	40·5	56·5	48·5	29·2	2nd	62·7	31st
CHANNEL	Jersey (St. Aubin's)	30·054	51·9	47·5	49·7	44·4	55·5	50·0	36·2	9th	64·4	21st

NOTE.—The stations marked thus 𝔐 are in connexion with the Royal Meteorological Society.

* At Durham the observations were taken at 10 a.m. and 10 p.m. each day.

STATIONS of the SECOND ORDER in the BRITISH ISLANDS, during the Month of MAY 1879.
corrected for Diurnal Range.

Latitude, beginning in each case with the Station lying furthest North.)

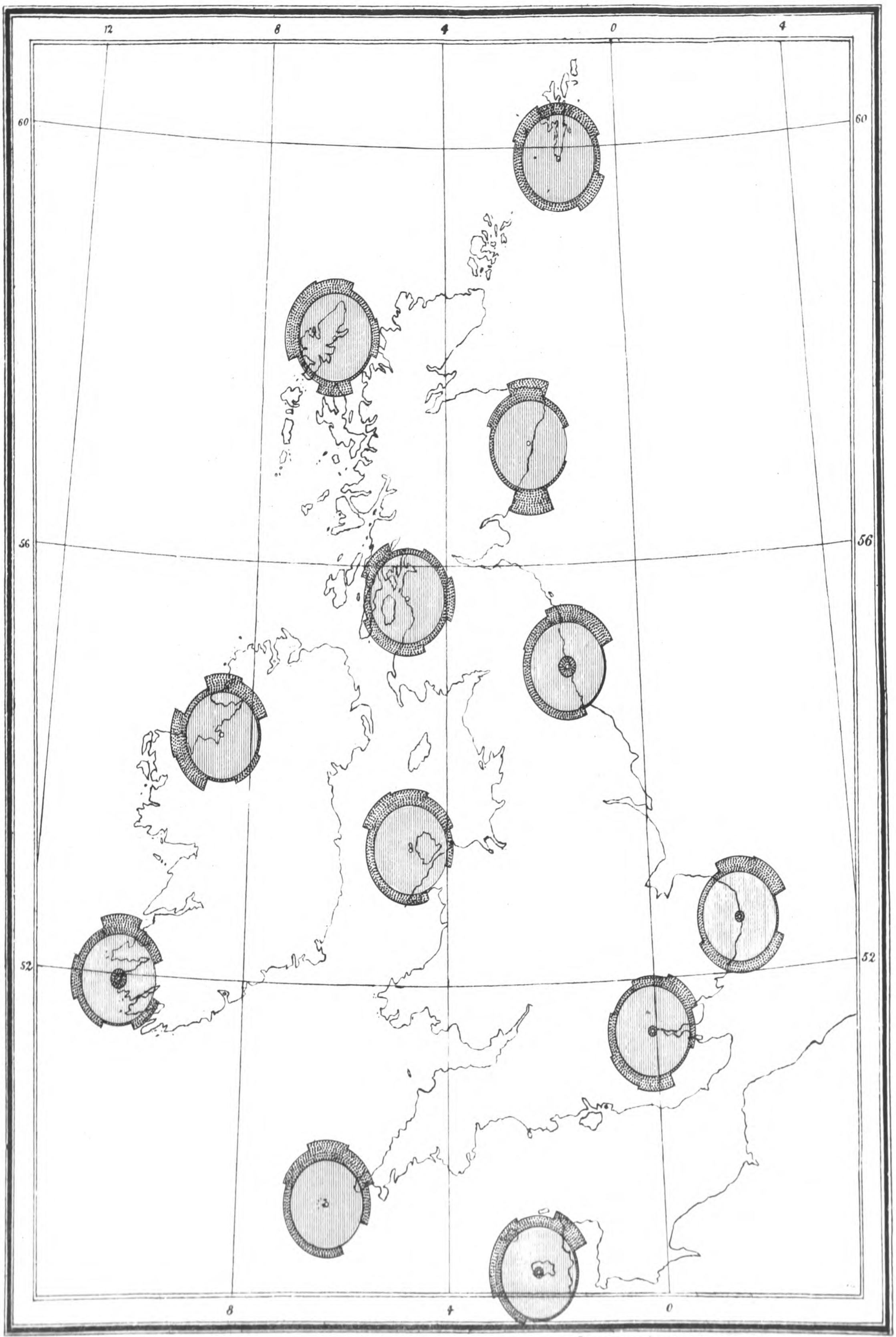
TENSION OF VAPOUR.			RELATIVE HUMIDITY.			AMOUNT OF CLOUD (0 to 10).			RAINFALL.			WEATHER. No. of Days of							WIND. No. of observations of								
At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
in.	in.	in.	%	%	%				ins.	ins.																	
0·255	0·242	0·249	83	87	85	6·0	5·2	5·6	2·500	0·600	26th	20	4	2	0	6	7	2	10	3	3	10	7	9	10	7	3
·243	·235	·239	76	83	80	7·2	6·9	7·1	2·112	·440	30th	15	1	1	1	2	12	0	9	4	9	1	2	12	13	5	7
·267	·259	·263	81	91	86	6·6	6·6	6·6	1·686	·385	22nd	14	3	4	1	3	13	3	17	7	2	1	3	7	5	3	17
·267	·245	·256	76	89	83	7·1	6·6	6·9	2·225	·509	21st	17	3	1	0	4	15	0	7	12	4	3	8	8	9	10	1
·270	·269	·270	80	88	84	7·5	6·0	6·8	3·490	·950	14th	19	1	2	0	3	12	0	3	19	3	5	2	6	13	4	7
·269	·260	·265	81	91	86	7·1	6·3	6·7	4·259	·830	14th	18	2	2	2	6	14	0	8	12	4	9	9	10	2	8	0
·292	·272	·282	78	90	84	7·3	7·1	7·2	3·151	·760	14th	16	1	7	3	1	14	0	6	17	2	10	2	15	2	8	0
·270	·263	·267	77	88	83	7·2	4·5	5·9	2·860	·500	15th	19	2	3	2	2	10	0	4	14	0	7	1	16	1	18	1
·267	·259	·263	75	84	80	8·2	5·3	6·8	2·530	·800	28th	17	0	2	1	1	11	0	10	10	8	6	11	6	3	5	3
·271	·277	·274	80	83	82	7·5	6·6	7·1	2·000	·420	29th	16	0	0	0	3	14	0	9	9	6	7	3	5	14	9	0
·254	·238	·246	79	86	82	7·6	6·6	7·1	3·460	·640	31st	20	3	1	1	0	12	0	4	5	11	5	1	10	11	13	2
·245	·250	·248	79	84	82	7·4	5·5	6·5	2·490	·310	31st	15	4	7	4	3	11	0	7	6	7	3	1	9	5	11	13
·258	·267	·263	75	81	78	8·2	6·4	7·3	3·220	·790	14th	22	2	1	1	2	16	0	4	17	4	1	3	21	0	9	3
·280	·272	·276	82	89	86	7·9	6·4	7·2	3·151	·583	15th	20	2	3	4	3	16	0	6	15	3	3	8	12	2	7	6
·262	·271	·267	79	85	82	8·4	6·5	7·5	3·220	1·080	14th	16	2	1	2	3	19	0	8	12	4	1	9	10	2	10	6
·270	·270	·270	81	87	84	6·5	7·5	7·0	2·225	0·557	14th	20	2	2	0	0	8	0	19	3	6	0	8	11	8	7	0
·287	·286	·287	81	87	84	7·7	6·8	7·3	2·800	1·000	28th	21	1	1	0	1	12	1	15	2	2	3	10	10	11	8	1
·263	·270	·267	76	85	80	7·8	6·0	6·9	3·446	1·330	28th	18	2	1	0	3	15	0	11	6	0	0	4	8	3	10	20
·278	·266	·272	75	82	79	7·7	6·0	6·9	3·587	1·427	28th	15	1	1	1	4	13	0	8	8	2	8	2	14	7	12	1
·287	·273	·280	77	87	82	7·1	5·2	6·2	3·290	1·250	23rd	12	1	4	1	1	7	0	12	9	3	3	3	13	6	2	11
·287	·270	·279	79	89	84	6·4	5·1	5·8	3·040	1·100	28th	19	2	3	1	2	7	6	16	7	6	1	9	11	4	3	5
·290	·289	·290	79	87	83	8·1	6·5	7·3	2·786	0·690	28th	17	1	1	1	3	18	0	4	15	3	7	4	16	5	8	0
·278	·266	·272	78	85	82	5·8	4·5	5·2	3·085	1·240	28th	20	0	4	1	5	7	1	9	14	1	1	12	11	5	5	4
·266	·274	·270	78	86	82	6·6	6·4	6·5	3·400	0·780	16th	14	0	3	0	4	14	1	1	0	8	4	0	5	14	7	23
·276	·262	·269	79	87	83	6·1	6·3	6·2	2·054	·330	25th	17	2	1	0	3	8	2	9	4	5	3	4	7	9	12	9
·279	·272	·276	78	83	80	5·8	6·1	6·0	1·880	·268	31st	12	1	1	0	8	12	0	15	1	17	0	3	1	14	10	1
·284	·285	·285	83	90	86	6·4	6·3	6·4	3·070	·670	28th	19	1	1	1	3	9	0	15	10	5	3	4	6	7	10	2
·281	·274	·278	76	86	81	6·9	6·1	6·5	3·140	·810	28th	19	1	1	0	4	13	0	26	1	9	3	6	4	7	3	3
·253	·247	·250	87	91	89	6·7	6·7	6·7	4·730	·890	30th	26	7	2	0	3	14	5	7	8	9	7	4	6	9	10	2
·283	·273	·278	79	85	82	6·6	6·6	6·6	2·190	·860	27th	23	1	2	1	3	10	0	6	13	3	4	5	14	5	12	0
·276	·278	·277	77	86	82	6·9	6·5	6·7	3·280	·540	16th	21	1	3	0	3	11	0	7	4	1	5	5	8	19	3	10
·269	·263	·266	80	85	83	7·6	7·3	7·5	3·500	·945	16th	15	—	—	—	0	14	1	8	10	1	5	0	5	4	17	12
·260	·262	·261	71	84	78	7·7	7·1	7·4	2·523	·630	23rd	20	0	2	0	3	16	0	11	4	5	3	2	7	3	17	10
·264	·271	·268	72	79	75	6·3	5·7	6·0	2·048	·308	25th	23	1	6	1	3	8	0	12	7	6	3	2	6	14	8	4
·265	·270	·268	72	83	77	7·1	7·1	7·1	2·550	·800	16th	17	0	2	0	5	16	0	9	3	1	3	8	6	8	16	8
·294	·280	·287	75	84	80	6·8	4·7	5·8	2·293	·716	26th	14	0	1	0	6	7	1	7	15	2	3	5	11	8	10	1

TABLE C., MAY.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at TELEGRAPHIC REPORTING STATIONS in the BRITISH ISLANDS during the Month of MAY 1879. Observations are made at 8 a.m. daily.

(The Stations are grouped in Districts, and then arranged in order of Latitude, beginning in each case with the Station lying furthest North.)

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 8 a.m.	AIR TEMPERATURE.								TENSION OF VAPOUR.	RELATIVE HUMIDITY.	AMOUNT OF CLOUD.	RAINFALL.			WEATHER. No. of Days of							WIND. No. of Observations of								
				Means of			Absolute Extremes.																									
			At 8 a.m.	Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.				Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
		ins.	°	°	°	°	°		°		in.	%		ins.	ins.																	
0. SCOTLAND, N.	Sumburgh Head	29·923	44·5	37·6	49·0	43·3	29	9th	59	29th	0·253	86	7·6	1·69	0·31	22nd	18	2	0	0	4	17	1	4	4	2	5	3	4	4	5	0
	Wick	29·955	45·9	37·6	52·6	45·1	30	1st	59	4th	·256	84	7·2	1·88	0·25	28th	18	1	1	0	5	17	0	4	4	2	2	7	5	1	6	0
	Stornoway	29·945	46·3	39·5	50·0	44·8	30	9th	55	22nd	·255	82	6·3	1·80	0·30	5th	18	0	2	0	9	14	5	5	2	3	1	6	2	6	6	0
1. SCOTLAND, E.	Nairn	29·978	46·3	40·7	54·0	47·4	30	1st	61	3rd, 4th, 18th, 23rd.	·237	76	5·2	2·24	0·87	29th	20	2	1	0	11	11	1	4	6	1	0	0	6	3	3	8
	Aberdeen	29·975	46·3	39·4	53·1	46·3	30	2nd	65	5th	·247	79	5·6	2·78	0·50	29th	17	3	3	0	12	13	3	9	2	0	1	11	2	2	4	0
	Leith	29·996	46·5	39·7	55·4	47·6	30	2nd	66	23rd	·257	81	6·4	1·40	0·45	30th	15	3	1	0	6	12	0	1	4	8	1	1	3	8	5	0
2. ENGLAND, N.E.	Shields	30·002	45·8	40·0	51·6	45·8	32	10th	64	5th	·252	82	7·1	1·76	0·24	14th	20	3	3	0	7	18	7	7	6	1	1	3	3	3	4	3
	~~Scarborough~~	30·003	46·9	41·5	51·4	46·5	34	10th	63	5th	·269	85	7·2	3·85	1·40	14th	20	1	1	0	7	16	0	11	3	0	2	4	5	4	1	1
	York	30·013	46·0	39·3	56·2	47·8	27	10th	68	5th	·265	86	6·9	2·05	0·37	29th	18	1	0	0	9	19	0	6	3	3	0	9	3	5	2	0
3. ENGLAND, E.	Yarmouth	29·995	47·1	41·9	50·9	46·4	35	1st, 8th, 9th.	60	30th	·274	85	5·2	2·58	0·76	23rd	16	1	3	0	11	10	0	6	7	1	4	4	4	2	2	1
	Cambridge	30·004	47·9	39·1	58·2	48·7	28	10th	68	5th, 21st	·277	84	7·5	3·32	0·57	15th, 28th	21	0	3	2	4	18	0	9	4	1	2	3	8	0	4	0
4. MIDLAND COUNTIES.	Nottingham	30·024	47·8	39·6	58·0	48·8	25	10th	69	5th, 21st	·264	80	7·8	3·63	1·15	14th	22	3	3	1	5	19	0	8	4	1	2	5	6	0	3	2
	Oxford	30·017	46·9	41·0	55·4	48·2	29	10th	65	5th	·272	86	7·7	2·55	0·92	28th	17	3	0	0	3	16	0	5	4	3	1	2	4	4	8	0
5. ENGLAND, S.	London	30·010	48·6	41·4	57·5	49·5	30	4th	68	20th	·265	77	6·4	3·49	1·64	28th	18	2	1	2	4	8	0	4	6	2	1	6	5	4	2	1
	Dover	30·003	49·1	43·3	53·5	48·4	36	1st, 2nd, 7th, 8th, 10th.	61	22nd	·279	79	3·8	2·22	0·56	23rd	15	0	5	1	12	3	0	5	7	1	0	2	8	6	2	0
	Hurst Castle	30·011	48·0	43·4	54·5	49·0	32	8th	64	25th	·292	88	5·6	1·46	0·34	17th	18	0	0	1	10	10	0	2	9	2	2	3	4	6	3	0
6. SCOTLAND, W.	Ardrossan	29·997	47·3	42·0	55·1	48·6	33	2nd	64	29th	·250	77	6·1	2·84	0·51	25th	22	0	3	1	9	14	0	2	3	5	2	5	5	3	6	0
7. ENGLAND, N.W.	Liverpool	30·019	48·2	43·3	54·0	48·7	34	1st, 2nd	61	24th, 31st	·265	79	6·4	2·24	0·40	14th	19	0	0	0	6	10	0	5	3	2	2	3	3	6	5	2
	Holyhead	30·034	47·3	44·4	53·4	48·9	39	2nd	60	21st	·278	86	5·0	2·79	0·70	13th	17	0	0	0	11	7	1	6	4	2	0	4	4	4	7	0
8. ENGLAND, S.W.	Pembroke	30·041	46·9	43·5	51·5	47·5	34	8th	57	4th, 5th	·272	86	5·8	2·88	0·75	28th	20	0	1	1	10	13	3	6	5	2	2	2	2	2	6	4
	Prawle Point	30·057	48·0	42·4	53·3	47·9	31	8th	61	16th	·297	90	7·2	2·33	0·94	27th	19	1	0	0	3	12	0	5	5	3	1	4	3	5	4	1
9. IRELAND, N.	Donaghadee	30·038	47·5	42·0	53·6	47·8	34	10th	60	27th	·281	86	4·5	3·63	0·48	16th	20	0	0	0	14	8	1	5	5	2	3	2	4	6	4	0
	Mullaghmore	30·046	48·3	43·5	53·0	48·3	36	2nd	60	21st	·274	81	7·3	2·91	0·67	23rd	18	0	2	0	6	15	8	7	5	1	2	1	6	7	2	0
10. IRELAND, S.	Kingstown	30·057	47·5	42·3	54·5	48·4	33	10th	63	31st	·252	77	6·2	2·03	0·26	13th	19	0	3	0	8	14	1	4	4	0	2	2	1	7	10	1
	Valencia	30·098	50·3	43·6	55·6	49·6	36	3rd	60	5th	·283	78	6·9	2·81	0·99	16th	18	0	0	0	4	10	0	8	4	0	3	1	3	5	4	3
	Roche's Point	30·069	49·3	44·2	58·2	51·2	36	7th	67	31st	·271	76	5·6	2·75	0·82	16th	15	0	0	0	7	10	3	12	4	3	3	1	2	2	4	0
CHANNEL ISLANDS	Scilly	30·065	50·5	47·0	53·8	50·4	41	8th	59	21st	·304	83	7·2	1·91	0·39	16th	20	0	1	0	4	13	7	8	6	3	0	3	3	3	5	0
	Jersey	30·058	49·0	44·7	53·8	49·3	37	9th	63	21st	·291	84	6·5	2·25	0·66	27th	14	0	2	0	3	9	6	4	7	1	1	1	4	6	6	1

MONTHLY WIND CHART FOR MAY, 1879.

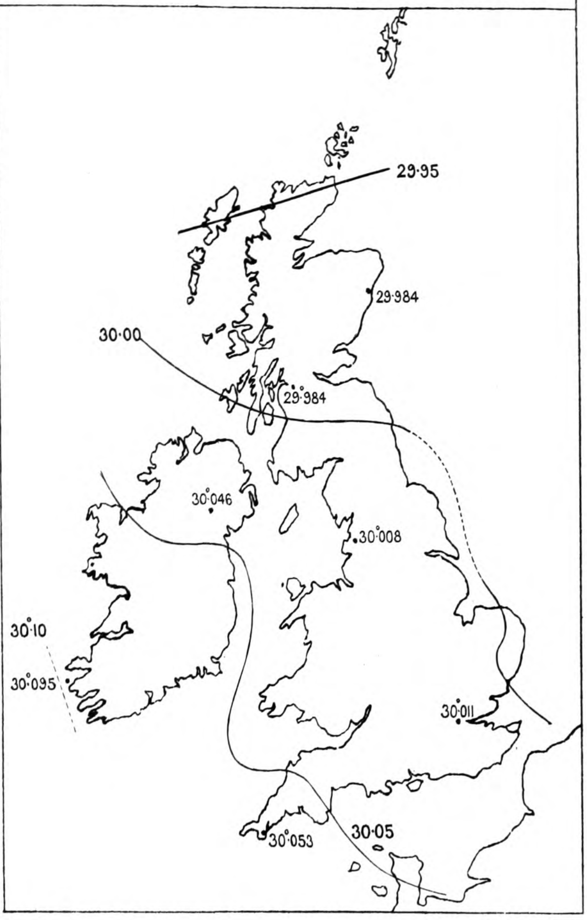


12
8
4
0
4
60
60
56
56
52
52
8
4
0

To face p. 72.

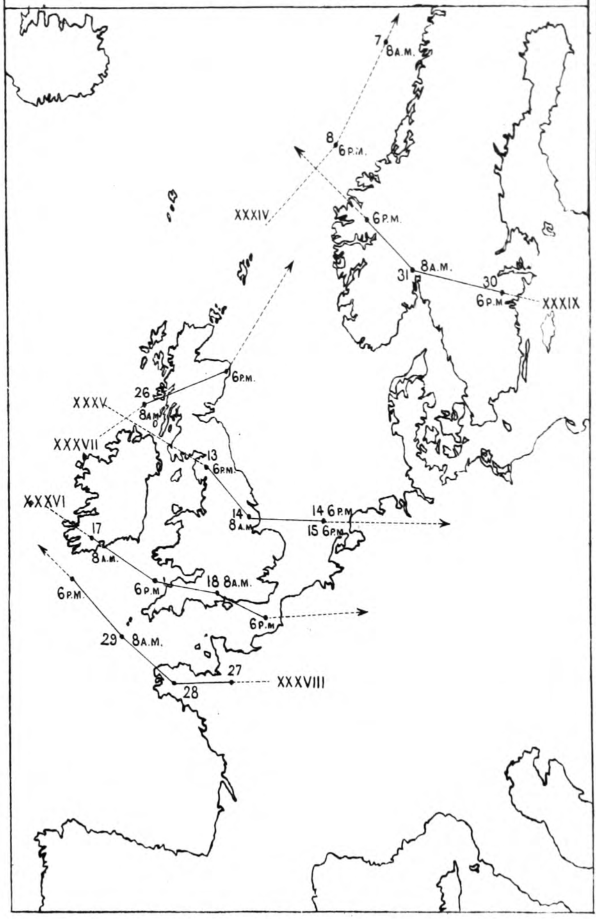
DANGERFIELD, LITH. 22, BEDFORD ST. COVENT GARDEN. 14518.

MONTHLY WEATHER CHART, MAY, 1879.



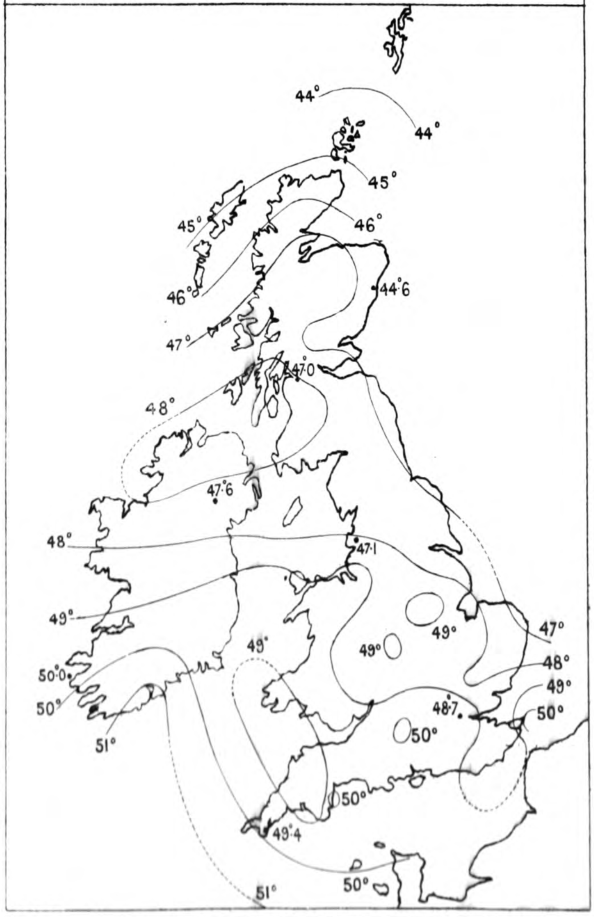
1. DISTRIBUTION OF MEAN PRESSURE

29·95
29·984
30·00
29·984
30°046
30°008
30°10
30°095
30°011
30°053
30·05



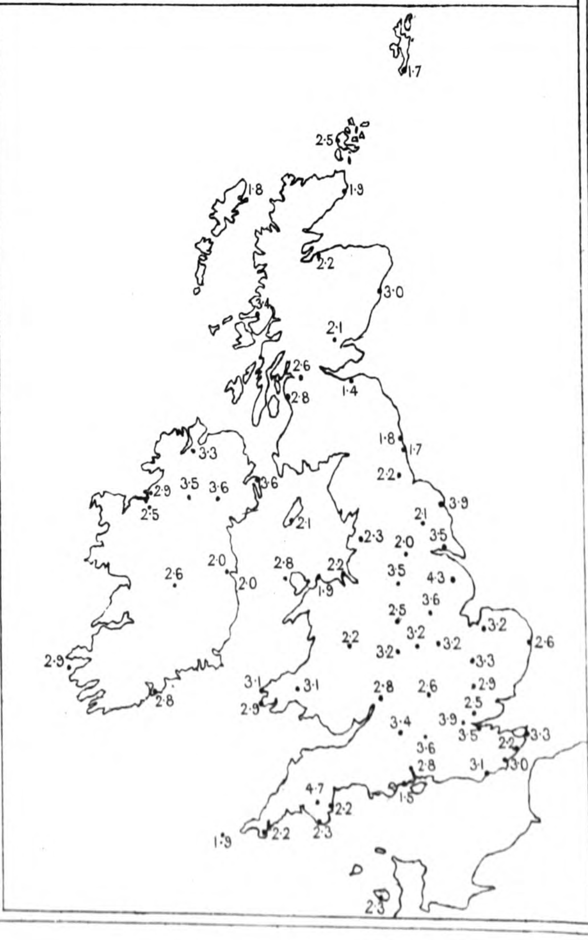
2. MOVEMENTS OF DEPRESSIONS.

7 8A.M.
8 6P.M.
XXXIV
6P.M.
31 8A.M.
30 6P.M.
XXXIX
26
XXXV
8A.M.
6P.M.
XXXVII
13 6P.M.
XXXVI
14 8A.M.
14 6P.M.
15 6P.M.
17 8A.M.
6P.M.
6P.M.
18 8A.M.
6P.M.
29 8A.M.
27
28
XXXVIII



3. DISTRIBUTION OF MEAN TEMPERATURE

44°
44°
45°
45°
46°
46°
47°
44°6
47·0
48°
47·6
48°
47·1
49°
47°
49°
49°
49°
48°
50°0
48·7
49°
50°
50°
51°
50°
50°
49°4
51°
50°



4. RAINFALL

1·7
2·5
1·8
1·9
2·2
3·0
2·1
2·6
2·8
1·4
1·8
1·7
3·3
2·2
2·9
3·5
3·6
3·6
3·9
2·5
2·1
2·1
2·3
2·0
3·5
2·0
2·8
2·2
3·5
4·3
2·6
2·0
1·9
3·6
2·5
3·2
2·2
3·2
3·2
2·6
2·9
3·2
3·3
3·1
3·1
2·8
2·6
2·9
2·9
2·8
2·5
3·4
3·9
3·5
3·3
2·2
3·6
3·0
2·8
3·1
4·7
1·8
2·2
1·9
2·2
2·3
2·3

To follow Wind Chart for May.

Dangerfield Lith. 22 Bedford St. Covent Garden. 14518.

REMARKS FOR JUNE 1879.

(*Tables A. to C., June, with Monthly Wind and Weather Charts.*)

Wind.—The wind distribution, as shown by the Monthly chart, was a little peculiar, inasmuch as while the predominant winds upon the Channel coasts and over southern England were from the Southward and Westward, with scarcely any indication of winds from the opposite quadrants; at the stations in the extreme north they were, on the other hand, almost as exclusively from North and East, while over the intermediate region a much more equable distribution prevailed.

At the beginning of the month fresh Westerly winds blew over the Channel and the south of England, and Northerly winds over the remainder of the kingdom, and with the exception of a temporary shift to the Southward at the southern stations on the 2nd, these conditions continued practically unchanged till the close of the 4th. The wind then shifted to East or South-east, and for several hours this continued to be the general direction; but on the 6th it became Southerly over Ireland and the greater part of England, and for several days afterwards the direction was governed by a series of depressions which skirted our western coasts, and it therefore varied between South and West over the southern portion of the kingdom, while Easterly winds predominated in the north. On the 13th the wind became light and variable, but by the following day it had again become Southerly, and continued to blow from between South and South-west till the close of the 15th. The wind then circulated round a depression, the centre of which lay over England during the next two days, and therefore it was at first Westerly in the south, Easterly over the north of England and Scotland, and Northerly in Ireland, becoming by the close of the 17th Northerly or North-westerly generally. A Southerly breeze set in in the west on the 18th and spread eastwards, rising at the same time in force till it blew a gale on the western coasts; and from this time till the close of the month the direction of the wind, under the influence of a long series of depressions which reached our western shores and in some cases crossed over the northern portion of the kingdom, alternated between South and West over the greater part of our Islands, while in the north it not unfrequently backed to South-east and East, and at times even to North. During the closing two or three days, however, the winds all over the kingdom were from between South and South-west, and were moderate or fresh in force.

Pressure.—The mean pressure for the month was again very much below the average, the mean isobars on the monthly chart ranging from 29·85 inches over the Channel to 29·65 inches along the western seaboard. This was due to the succession of shallow depressions experienced during the month, which kept the barometer persistently low, although the mercury never fell to any specially low point. The range of pressure was only small, the maximum readings being low and the minima high. The former occurred at all the observatories on the 13th, the highest being only 30·21 inches recorded at Falmouth; the dates of the minima were, however, very irregular, the lowest point reached was 29·15 inches at Valencia, quite at the end of the month, but at no other observatory did it fall below 29·3 inches.

Movements of the Depressions.—Shallow systems of low pressure were very common during the month, but in no case was anything like a deep depression experienced. They reached us in two series, separated from each other by a shallow high-pressure system which lasted from about the 9th to the 15th of the month. In almost every case the depressions followed a northerly or north-easterly course, the centre passing in a few cases over our Islands, but keeping in most instances more to the westward and merely skirting our western coasts.

Temperature.—As in the two preceding months of this quarter the mean temperature was again below the average all over the kingdom, but especially so over the English midlands and southern counties. The isotherms on the monthly chart, based upon the values corrected for height above sea-level, range from 58° at a few isolated places in south-eastern England, to 55° over the greater part of Ireland, and 51° in the north of Scotland. The thermometer kept persistently low throughout the month, and the maximum readings observed were much lower than those usually recorded in June and occurred at irregular dates. The minima were in most cases registered during the first few days of the month, and were not unusually low, so that the range of temperature for the month was not great.

Vapour Tension.—Vapour tension decreased in a fairly uniform manner from ·40 inch over the Channel to ·32 inch in the north of Scotland, the mean value over the greater part of England and Wales being about ·37 inch. *Relative Humidity*, on the other hand, was highest over both extremities of the British Isles, the mean percentage over the Channel and at the the Shetlands being 90, while over the greater portion of the intervening region it was about 85.

Rainfall.—The fall of rain was a good deal below the average at the stations in the extreme north, but everywhere else it was considerably in excess, and particularly so over the southern and western portions of the kingdom, and over the central parts of England. The fall at Dartmoor amounted to nearly 16 inches, at Roche's Point to upwards of 9 inches, at Carmarthen to nearly as much, and at Falmouth to 7·5 inches; while at Sumburgh Head it was less than an inch, and at Stornoway only 1·1 inch. The heaviest daily falls most generally occurred either about the 7th or at the close of the month; nearly 3 inches fell at Dartmoor on the 30th, 1·8 inches at Hastings on the 2nd, and upwards of an inch at other stations; but the large totals were apparently less due to these exceptionally heavy daily falls than to the persistently wet character of the weather throughout the month.

TABLE A., JUNE.—SHOWING the MEAN and EXTREME PRESSURES and TEMPERATURES recorded at each of the SEVEN SELF-RECORDING OBSERVATORIES of the METEOROLOGICAL OFFICE during the Month of JUNE 1879; together with the MONTHLY VAPOUR TENSION, the RELATIVE HUMIDITY, and TOTAL RAINFALL.

NAMES OF OBSERVATORIES.	PRESSURE at 32° F. and the Mean Sea Level (In English Inches).						TEMPERATURE In the Shade (In Degrees Fahrenheit).						HYGROMETRIC VALUES.		RAINFALL (In English Inches).
	Mean for the Month.	Extremes.				Range.	Mean for the Month.	Extremes.				Range.	Tension of Vapour (In English Inches).	Relative Humidity (Saturation = 100).	
		Minimum.		Maximum.				Minimum.		Maximum.					
		Reading.	Date.	Reading.	Date.			Reading.	Date.	Reading.	Date.				
	ins.	ins.	D. H.	ins.	D. H.	ins.	°	°	D. H.	°	D. H.	°	in.	%	ins.
Valencia - -	29·676	29·152	30th, Midt.	30·152	13th, 8 a.m.	1·000	54·9	41·9	2nd, 4 a.m.	66·1	11th, 7 p.m.	24·2	0·358	84	7·160
Armagh - -	·693	·304	27th, 2 p.m.	·137	13th, 11 a.m. 1 p.m. 2 p.m. 4 p.m.	0·833	54·1	39·9	2nd, 2 a.m.	66·0	15th, 3 p.m.	26·1	·351	84	5·140
Glasgow - -	·684	·365	27th, 5 p.m.	·127	13th, 9 a.m.	0·762	53·5	39·0	1st, 5 a.m.	66·8	14th, 3 p.m. 4 p.m.	27·8	·321	78	5·878
Aberdeen - -	·730	·394	22nd, 4 a.m.	·178	13th, 2 p.m.	0·784	50·5	40·0	1st, 0·5 a.m.	65·9	20th, 7 p.m.	25·9	·309	84	2·818
Falmouth - -	·794	·414	8th, 5 a.m.	·213	13th, 1 p.m.	0·799	55·5	45·6	4th, 3 a.m.	63·9	13th, 10 a.m.	18·3	·378	86	7·475
Stonyhurst - -	·734	·369	21st, 7 p.m.	·153	13th, 10 p.m. 11 p.m.	0·784	54·2	38·3	5th, 3 a.m.	66·6	14th, 5 p.m.	28·3	·335	80	4·763
Kew - -	29·812	29·407	3rd, 6 a.m.	30·165	13th, 9 p.m. 10 p.m.	0·758	57·1	43·0	4th, 4 a.m. 5th, 4 a.m.	69·7	14th, 1 p.m.	26·7	0·379	82	4·205

TABLE B., JUNE.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at

The values are not

(The Stations are grouped in Districts, and then arranged in order of

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 9 a.m. and 9 p.m.	AIR TEMPERATURE.									
						Means of			Absolute Extremes.			
			At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.
		ins.	°	°	°	°	°	°	°		°	
0. SCOTLAND, N.	Sandwick Manse (Orkneys)	29·709	50·8	49·3	50·1	45·6	56·1	50·9	41·2	6th	65·5	21st
1. SCOTLAND, E.	Glenalmond	29 716	51·6	50·5	51·1	45·6	58·5	52·1	36·4	1st, 3rd	65·7	14th
2. ENGLAND, N.E.	Seaham	29·725	56·0	51·6	53·8	47·2	61·4	54·3	39·7	2nd	71·7	20th
	Durham*	29·720	57·3	49·9	53·6	46·2	63·3	54·8	38·4	2nd	72·4	19th
	Hull	29·769	57·4	54·2	55·8	49·4	63·7	56·6	41·0	5th	72·5	19th
	Kelstern 𝔐	29·778	55·2	52·0	53·6	46·6	61·7	54·2	36·9	5th	68·6	20th
3. ENGLAND, E.	Hillington 𝔐	29·789	58·3	53·3	55·8	47·8	64·3	56·1	35·3	5th	70·0	28th
	Audley End 𝔐 (Saffron Walden).	29·809	58·1	53·7	55·9	49·1	64·2	56·7	38·0	5th	70·9	14th
	Chigwell Row	29·848	57·4	55·2	56·3	49·9	62·7	56·3	41·2	4th	68·5	14th
4. MIDLAND COUNTIES.	Wakefield 𝔐	29·746	55·9	54·7	55·3	48·9	62·6	55·8	38·1	5th	69·0	19th
	Buxton 𝔐	29·787	53·3	50·6	52·0	46·3	59·6	53·0	37·8	19th	65·3	20th
	Cheadle 𝔐	29·757	53·4	52·0	52·7	47·0	60·1	53·6	39·1	4th	65·3	14th
	Leicester	29·768	57·2	55·6	56·4	49·1	62·9	56·0	39·5	2nd, 5th	68·3	28th
	Uppingham	29·777	56·1	52·9	54·5	47·7	62·5	55·1	38·3	2nd	70·1	5th
	Oscott	29·764	55·2	53·5	54·4	48·2	62·5	55·4	39·1	2nd	67·9	20th
	Churchstoke 𝔐	29·776	54·9	52·9	53·9	47·2	61·3	54·3	35·0	5th	65·1	13th, 14th
	Cheltenham 𝔐	29·781	57·6	54·3	56·0	48·5	64·1	56·3	35·2	4th	68·8	13th
5. ENGLAND, S.	Marlborough 𝔐	29·815	56·4	53·3	54·9	49·4	63·7	56·6	38·7	4th	69·7	13th
	Strathfield Turgiss 𝔐	29·821	58·4	54·0	56·2	49·1	64·5	56·8	38·8	4th	69·2	18th
	Ramsgate 𝔐	29·864	58·4	54·4	56·4	50·5	66·0	58·3	42·8	4th	75·2	11th
	Folkestone	29·853	56·6	53·6	55·1	50·0	61·3	55·7	42·8	5th	68·6	28th
	Southampton	29·823	57·1	54·6	55·9	51·4	61·8	56·6	42·1	4th	67·7	18th
	Hastings	29·857	56·7	53·7	55·2	50·9	60·9	55·9	42·4	4th	67·1	28th
6. SCOTLAND, W.	Laudale	29·689	55·5	53·3	54·4	48·3	61·3	54·8	38·1	3rd	67·8	13th
7. ENGLAND, N.W.	Douglas (Isle of Man)	29·706	54·3	51·1	52·7	47·7	58·0	52·9	40·3	11th	64·7	16th
	Llandudno 𝔐	29·729	56·5	53·9	55·2	50·8	61·0	55·9	41·8	5th	67·8	19th
8. ENGLAND, S.W.	St. David's (Pembroke)	29·740	54·7	52·3	53·5	49·6	59·0	54·3	43·8	18th	62·2	13th
	Caermarthen 𝔐	29·754	56·6	52·8	54·7	49·1	62·2	55·7	37·1	2nd	67·9	5th
	Dartmoor 𝔐	29·795	50·6	48·9	49·8	45·9	54·2	50·1	41·0	4th	59·2	18th
	Babbacombe 𝔐	29·805	56·4	52·5	54·5	50·2	61·2	55·7	41·9	4th	69·2	18th
9. IRELAND, N.	Londonderry	29·688	56·0	53·4	54·7	49·1	60·5	54·8	35·7	4th	65·0	20th
	Brookborough	29·650	54·2	52·6	53·4	47·8	61·4	54·6	33·6	2nd	67·9	15th
	Markree Castle	—	55·2	51·6	53·4	47·0	61·3	54·2	30·7	2nd	66·8	15th
10. IRELAND, S.	Dublin	29·710	56·5	54·3	55·4	50·3	61·5	55·9	40·9	2nd	69·4	27th
	Parsonstown	29·695	55·8	52·6	54·2	47·4	62·1	54·8	34·4	2nd	67·5	18th
CHANNEL	Jersey (St. Aubin's)	29·893	58·0	55·2	56·6	51·9	62·5	57·2	46·0	4th	71·2	27th

NOTE.—The stations marked thus 𝔐 are in connexion with the Royal Meteorological Society.

* At Durham the observations were taken at 10 a.m. and 10 p.m. each day.

STATIONS of the SECOND ORDER in the BRITISH ISLANDS during the Month of JUNE 1879.
corrected for Diurnal Range.

Latitude, beginning in each case with the Station lying furthest North.)

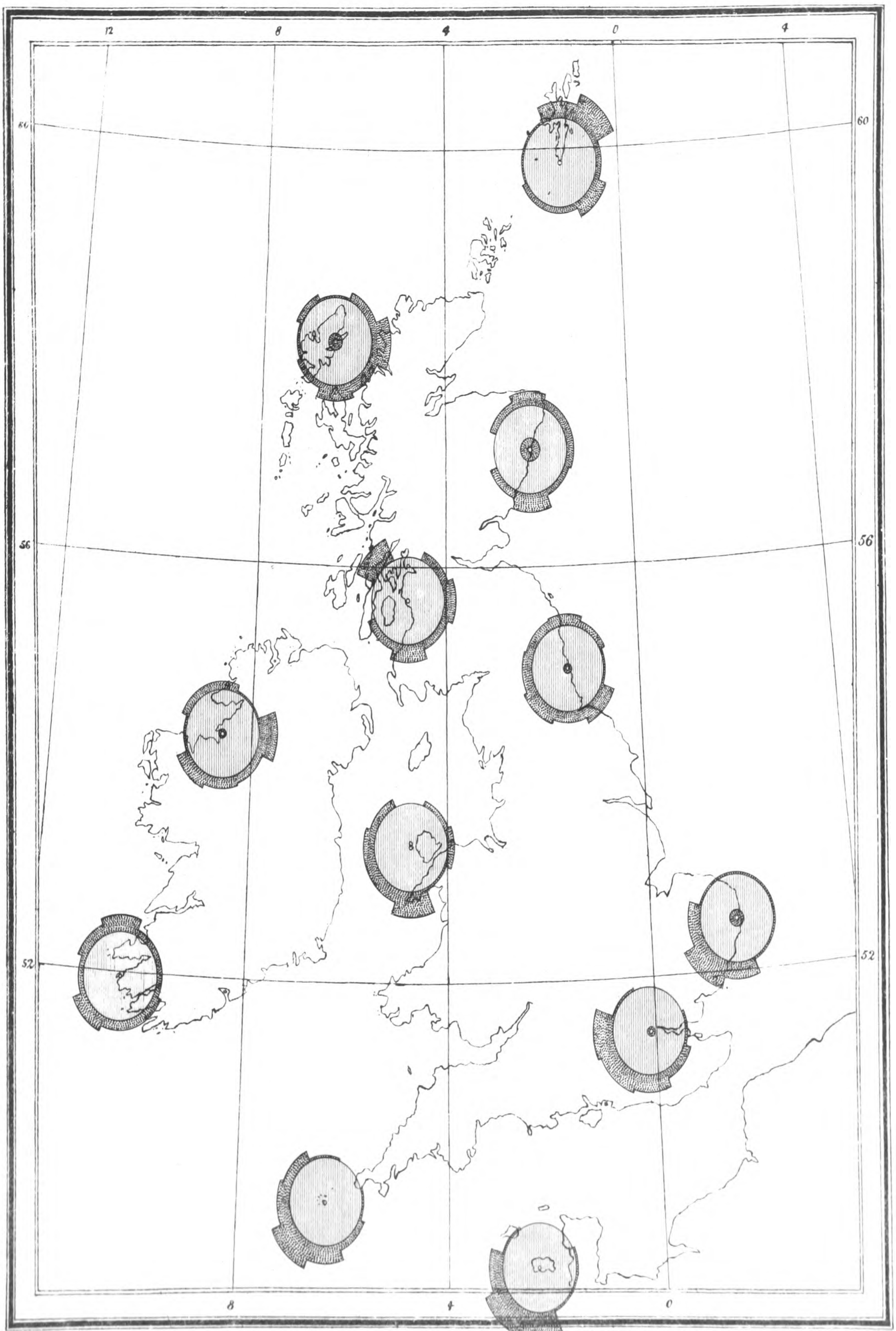
TENSION OF VAPOUR.			RELATIVE HUMIDITY.			AMOUNT OF CLOUD (0 to 10).			RAINFALL.			WEATHER, No. of Days of							WIND, No. of Observations of								
At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
in.	in.	in.	%	%	%				ins.	ins.																	
·311	·301	·306	84	86	85	7·7	6·3	7·0	1·380	0·700	3rd	8	0	0	0	3	14	2	5	3	13	19	4	1	3	5	7
·330	·336	·333	86	91	89	8·9	8·2	8·6	5·340	·840	7th	24	0	1	1	0	21	0	1	5	19	6	4	8	4	5	8
·360	·343	·352	80	90	85	7·7	7·0	7·4	4·128	·960	7th	20	0	2	5	0	11	0	3	1	2	2	7	14	4	3	24
·362	·330	·346	77	91	84	8·2	6·2	7·2	3·571	0·929	7th	20	0	0	6	1	13	0	2	4	9	6	12	15	6	3	3
·376	·364	·370	80	86	83	7·8	6·1	7·0	3·500	1·000	7th	26	0	0	2	0	11	0	0	2	9	3	1	18	14	3	10
·356	·342	·349	82	88	85	7·6	5·7	6·7	4·013	0·860	7th	20	0	1	4	1	8	0	0	4	5	4	8	27	8	2	2
·399	·378	·389	82	92	87	8·0	7·7	7·9	4·345	·640	30th	21	0	0	6	0	15	0	0	2	4	14	4	29	4	3	0
·380	·375	·378	79	91	85	7·9	6·2	7·1	3·860	·620	11th	25	0	0	6	0	15	0	2	0	1	10	4	32	5	3	3
·379	·365	·372	80	84	82	9·0	7·1	8·1	4·580	·820	24th	20	0	2	2	0	17	0	0	0	4	7	14	23	8	3	2
·362	·368	·365	81	86	83	7·9	6·1	7·0	3·790	0·950	7th	22	0	0	4	0	10	0	1	7	7	6	9	14	12	4	0
·330	·331	·331	81	89	85	8·5	7·9	8·2	6·615	1·050	7th	25	0	1	5	0	18	0	3	1	4	11	1	17	16	6	1
·345	·343	·344	84	88	86	8·0	6·5	7·3	6·400	1·250	7th	24	0	3	6	0	11	6	3	2	6	9	16	14	3	4	3
·362	·365	·364	77	82	80	8·4	7·0	7·7	4·340	0·790	7th, 30th	24	0	1	2	0	17	0	1	9	1	3	5	30	6	2	3
·384	·369	·377	85	91	88	8·5	6·4	7·5	4·392	·813	2nd	23	0	0	3	0	12	1	2	0	5	5	11	19	14	2	2
·358	·356	·357	82	87	84	9·1	6·9	8·0	4·650	·740	7th	24	0	3	8	0	18	1	3	5	4	4	19	19	1	3	2
·355	·360	·358	82	89	86	7·0	7·3	7·2	4·761	·675	7th	24	0	1	6	0	7	0	2	1	6	8	16	15	9	3	0
·403	·378	·391	85	90	87	8·2	7·3	7·8	4·340	·820	30th	26	0	1	5	0	14	2	2	0	1	4	24	9	17	3	0
·371	·362	·367	82	89	85	9·0	7·1	8·1	4·990	·882	30th	25	0	1	2	0	17	0	1	1	4	1	12	23	4	3	11
·388	·371	·380	80	89	84	8·7	7·1	7·9	5·117	·863	30th	24	0	1	2	0	16	0	0	0	2	1	13	35	6	2	1
·397	·386	·392	82	91	86	7·6	6·6	7·1	2·710	0·970	25th	15	0	0	1	0	9	1	0	1	2	2	4	35	1	0	15
·400	·382	·391	87	93	90	7·9	6·7	7·3	3·106	1·240	2nd	19	0	0	3	1	16	2	0	1	5	3	19	23	9	0	0
·394	·391	·393	85	91	88	9·1	7·8	8·5	5·254	1·147	30th	21	0	0	1	0	20	0	0	0	1	6	11	34	2	6	0
·389	·376	·383	85	91	88	8·0	7·0	7·5	4·325	1·800	2nd	21	0	0	1	1	15	3	0	5	1	2	15	23	12	1	1
·348	·358	·353	79	87	83	7·6	8·4	8·0	4·500	0·870	19th	17	0	0	1	0	15	2	4	0	5	8	6	7	4	4	22
·355	·349	·352	84	92	88	8·2	7·8	8·0	4·401	1·015	7th	13	0	0	0	0	16	2	4	1	13	4	8	9	5	4	12
·371	·362	·367	81	86	84	8·0	7·4	7·7	3·256	0·795	7th	18	0	0	3	1	16	0	7	0	9	1	8	6	20	9	0
·372	·364	·368	87	92	90	7·7	7·5	7·6	6·430	1·180	15th	23	0	0	0	0	15	0	2	3	7	9	10	16	7	5	1
·378	·367	·373	83	92	87	8·2	7·6	7·9	8·910	1·530	30th	23	0	0	2	0	19	2	4	0	5	9	7	20	5	4	6
·347	·339	·343	94	98	96	8·7	9·2	9·0	15·890	2·890	30th	29	0	1	1	0	21	5	0	1	1	5	10	11	18	11	3
·390	·365	·378	86	92	89	7·9	7·3	7·6	7·340	1·530	30th	26	0	0	2	0	14	0	0	3	1	4	12	28	10	2	0
·358	·359	·359	80	88	84	8·6	8·2	8·4	4·380	0·480	30th	25	0	0	2	0	21	0	3	12	6	5	7	11	3	6	7
·355	·353	·354	84	89	87	9·2	8·5	8·9	5·787	1·035	30th	22	—	—	—	0	23	4	3	15	5	5	5	5	1	8	13
·352	·333	·343	81	87	84	9·0	7·5	8·3	3·166	0·812	30th	25	0	0	5	0	19	0	6	4	5	8	12	9	0	8	8
·358	·360	·359	78	85	82	7·8	6·8	7·3	4·046	0·560	30th	24	0	1	3	0	12	0	2	3	6	13	5	13	10	6	2
·353	·342	·348	79	86	82	8·6	6·3	7·5	4·899	1·369	16th	24	0	0	2	2	15	0	6	4	2	7	11	11	3	7	9
·409	·386	·398	85	88	87	7·7	6·6	7·2	3·413	0·702	15th	22	0	0	1	0	12	0	0	1	2	3	18	20	13	0	3

TABLE C., JUNE.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at TELEGRAPHIC REPORTING STATIONS in the BRITISH ISLANDS during the Month of JUNE 1879. Observations are made at 8 a.m. daily.

(The Stations are grouped in Districts, and then arranged in order of Latitude, beginning in each case with the Station lying furthest North.)

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 8 a.m.	AIR TEMPERATURE.									TENSION OF VAPOUR.	RELATIVE HUMIDITY.	AMOUNT OF CLOUD.	‡ RAINFALL.			WEATHER. No. of Days of							WIND. No. of Observations of								
				Means of			Absolute Extremes.																									
			At 8 a.m.	Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.				Total Fall in the Month.	Maximum Fall in one Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
		ins.	°	°	°	°	°		°		in.	°/o		ins.	ins.																	
0. SCOTLAND, N.	Sumburgh Head	29·713	49·3	44·7	53·4	49·1	37	6th	62	30th	0·316	90	7·6	0·91	0·28	2nd	13	0	0	0	3	13	0	6	11	2	5	2	2	1	1	0
	Wick	29·700	50·7	44·4	56·4	50·4	38	1st	65	20th, 21st 29th, 30th.	·321	88	6·7	0·97	0·30	1st	14	0	1	0	7	16	0	4	4	11	3	3	1	0	3	1
	Stornoway	29·655	51·8	46·3	55·9	51·1	40	1st	63	19th	·343	88	6·6	1·12	0·30	28th	10	0	0	1	6	12	3	1	3	9	4	6	2	1	2	2
1. SCOTLAND, E.	Nairn	29·694	51·3	47·5	58·3	52·9	40	1st, 14th	72	19th	·309	82	6·7	2·83	0·79	3rd	20	0	0	5	7	15	0	1	2	3	0	2	1	2	2	17
	Aberdeen	29·703	52·2	47·1	57·7	52·4	40	1st, 2nd, 6th.	67	20th	·332	85	7·3	2·35	0·61	21st	18	0	1	0	3	13	1	5	3	3	2	8	3	0	2	4
	Leith	29·696	52·9	47·6	60·3	54·0	39	1st	74	19th	·338	85	7·4	4·71	1·10	21st	22	0	0	1	1	12	0	0	7	9	0	3	4	3	4	0
2. ENGLAND, N.E.	Shields	29·716	53·4	48·2	59·1	53·7	40	1st	68	15th	·352	86	8·0	3·39	0·73	7th	17	1	1	5	3	20	3	4	2	1	6	4	5	4	3	1
	Scarborough	29·743	54·5	49·0	61·2	55·1	42	2nd	69	20th	·365	86	7·3	?2·78	?0·74	?7th	20	0	1	3	5	15	0	2	2	2	3	2	12	6	1	0
	York	29·751	54·6	47·8	63·3	55·6	38	5th	71	19th	·359	84	7·0	3·34	0·72	7th	23	0	1	3	5	15	0	1	1	4	1	9	8	5	1	0
3. ENGLAND, E.	Yarmouth	29·811	56·3	50·2	61·1	55·7	42	4th	69	28th	·384	84	5·7	2·57	0·40	2nd	19	0	0	4	9	12	0	1	1	1	1	6	12	5	1	2
	Cambridge	29·793	56·3	48·8	66·0	57·4	40	4th	71	28th	·404	89	8·0	5·21	0·65	5th	24	0	1	6	6	23	0	0	1	2	1	10	11	1	4	0
4. MIDLAND COUNTIES.	Nottingham	29·776	56·3	48·1	66·0	57·1	37	5th	72	5th, 14th, 17th, 20th	·382	84	8·0	4·88	0·73	7th	23	0	0	10	4	19	0	2	2	0	1	14	8	1	1	1
	Oxford	29·789	55·5	50·3	63·4	56·9	41	4th	71	5th	·378	86	8·8	4·46	0·63	16th	26	0	0	2	0	22	0	0	0	2	1	10	7	7	1	2
5. ENGLAND, S.	London	29·807	57·9	50·4	65·7	58·1	41	4th	71	5th, 28th	·384	80	7·2	4·07	0·67	24th	20	0	1	4	1	12	0	0	0	1	3	7	8	9	1	1
	Dover	29·839	56·8	53·1	61·1	56·6	46	4th	68	28th	·388	85	4·8	2·64	0·78	2nd	19	0	0	4	8	4	0	0	0	2	0	0	17	7	1	3
	Hurst Castle	29·805	55·5	52·8	59·0	55·9	47	4th	67	18th	·397	90	6·3	4·65	0·80	30th	22	0	0	0	5	11	2	0	0	2	3	6	10	6	3	0
6. SCOTLAND, W.	Ardrossan	29·678	53·3	49·3	60·9	55·1	41	3rd	70	11th	·331	81	7·8	5·90	1·15	7th	23	0	1	2	5	18	0	0	3	5	3	7	3	0	9	0
7. ENGLAND, N.W.	Liverpool	29·724	55·5	50·6	61·9	56·3	43	2nd	68	14th, 19th	·362	82	7·4	3·54	0·91	7th	17	0	0	0	3	14	1	0	1	4	9	3	6	6	1	0
	Holyhead	29·716	54·4	50·7	61·3	56·0	44	2nd, 5th	70	14th	·372	88	6·7	3·54	0·67	7th	20	0	0	0	6	11	1	0	2	3	1	11	5	5	3	0
8. ENGLAND, S.W.	Pembroke	29·721	53·0	50·8	56·8	53·8	46	1st	60	5th, 15th	·371	92	7·2	6·59	1·11	15th	22	0	0	0	5	16	3	1	1	4	4	7	5	4	3	1
	Prawle Point	29·817	53·0	49·8	57·0	53·4	45	4th	61	17th	·383	95	7·7	4·59	0·66	24th	23	0	0	0	4	16	2	0	0	2	2	10	10	3	1	2
9. IRELAND, N.	Donaghadee	29·703	52·6	47·9	58·3	53·1	43	2nd	64	10th, 20th	·367	93	7·0	5·29	0·98	7th	20	0	0	1	4	13	3	3	5	4	3	4	5	4	2	0
	Mullaghmore	29·651	53·8	50·4	59·5	55·0	45	1st, 2nd, 5th.	64	15th	·355	85	8·2	3·13	0·62	30th	23	0	0	0	2	16	6	3	1	9	3	4	5	1	3	1
10. IRELAND, S.	Kingstown	29·695	54·2	49·3	61·4	55·4	42	3rd	68	27th	·345	82	7·1	4·59	0·72	30th	27	0	0	1	1	11	1	2	1	2	7	4	3	4	4	3
	Valencia	29·667	55·1	49·5	59·8	54·7	42	3rd, 10th	63	16th	·358	82	7·9	7·04	0·92	30th	24	0	0	0	1	17	3	6	2	2	4	4	6	2	4	0
	Roche's Point	29·691	54·5	50·6	64·2	57·4	44	3rd	70	10th, 14th	·355	83	6·9	9·17	1·04	30th	26	0	0	1	5	15	5	6	0	4	4	5	5	3	3	0
CHANNEL ISLANDS	Scilly	29·768	56·2	53·2	59·4	55·8	48	4th	63	18th, 30th	·408	90	8·1	5·59	0·99	30th	29	0	0	1	0	15	6	1	0	1	2	6	11	5	4	0
	Jersey	29·885	55·6	52·0	60·4	56·2	47	4th	67	27th	·399	90	7·4	3·20	0·76	15th	21	0	0	1	2	13	6	0	0	1	1	10	11	6	1	0

MONTHLY WIND CHART FOR JUNE, 1879.


12
8
4
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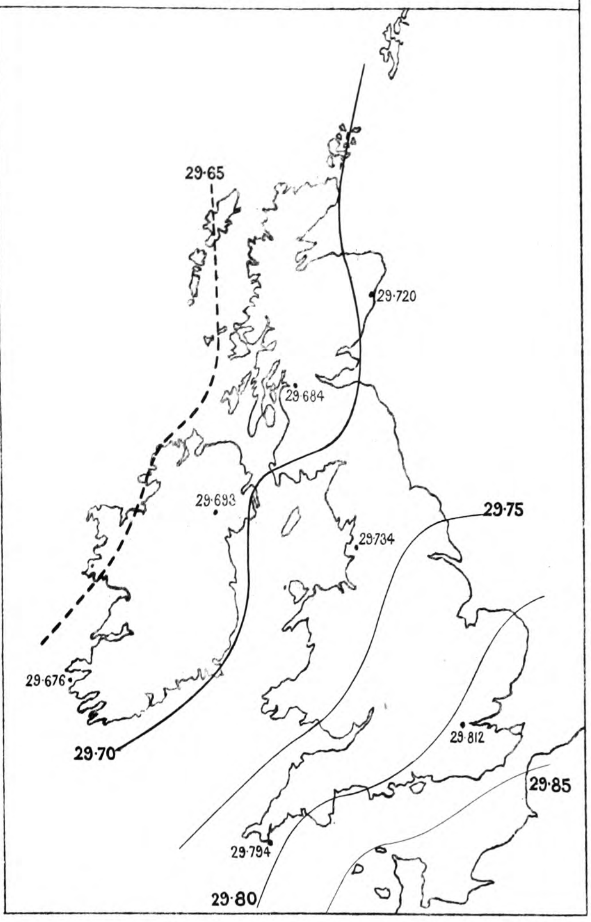
4
60
56
52
60
56
52
8
4
0

To face p. 78.

DANGERFIELD, LITH. 22, BEDFORD ST COVENT GARDEN. 14518.

MONTHLY WEATHER CHART, JUNE, 1879.

1. DISTRIBUTION OF MEAN PRESSURE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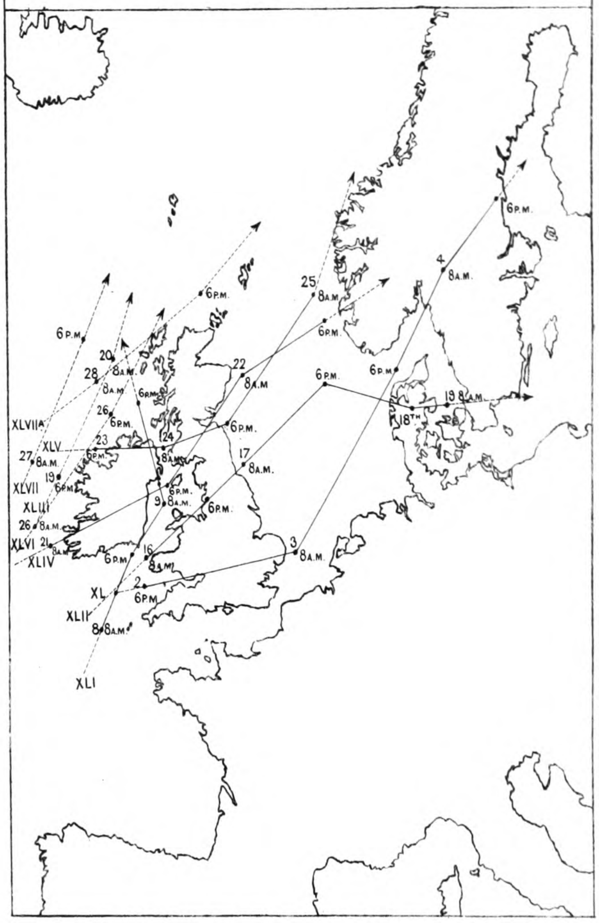
29·720
29·684
29·693
29·734
29·75
29·676
29·70
29·812
29·85
29·794
29·80

2. MOVEMENTS OF DEPRESSIONS.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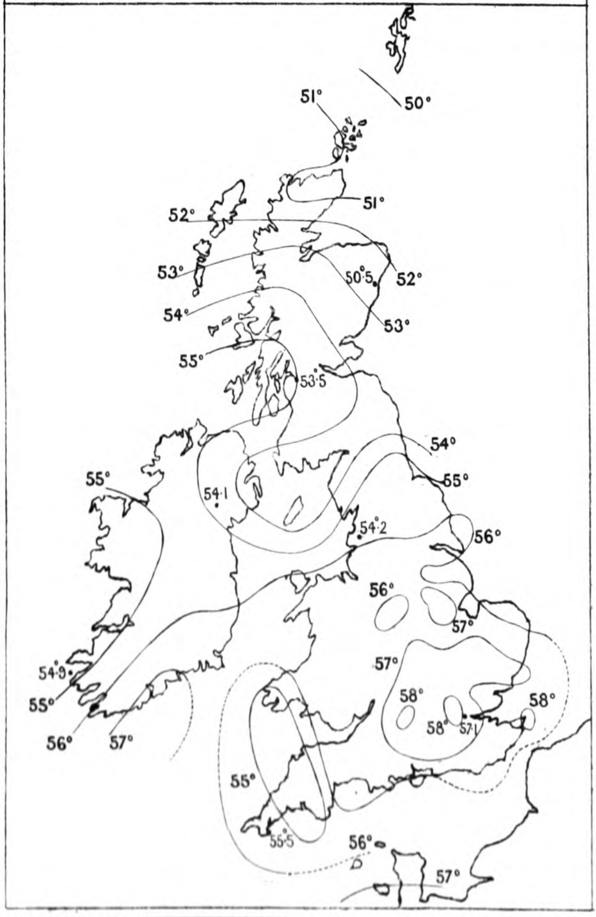
6P.M.
25
8A.M.
4
8A.M.
6P.M.
6P.M.
20
28
8A.M.
8A.M.
6P.M.
22
8A.M
6P.M.
6P.M.
19 8A.M.
18TH
26
6P.M.
XLVIIA
XLV
23
6P.M.
24
8A.M.
6P.M.
17
8A.M.
27
8A.M.
XLVII
19
6P.M.
XLIII
6P.M.
9
8A.M.
6P.M.
26
8A.M.
XLVI
21
8A.M.
XLIV
6P.M.
16
8A.M.
3
8A.M.
XL
2
6P.M.
XLII
8
8A.M.
XLI

3. DISTRIBUTION OF MEAN TEMPERATURE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51°
52°
53°
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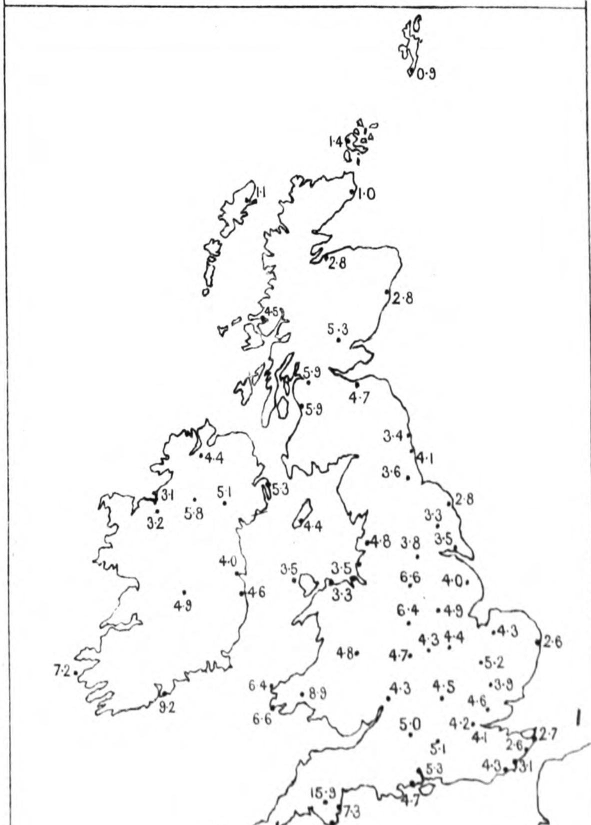
54°
53°
55°
53·5
54°
55°
55°
54·1
54·2
56°
56°
57°
57°
54·9
55°
56°
57°
58°
58°
57·1
58°
55°
55·5
56°
57°

4. RAINFALL


0·9
1·4
1·1
1·0
2·8
2·8
4·5
5·3
5·9
5·9
4·7
3·4
4·1
3·6
4·4
3·1
5·1
5·3
3·2
5·8
2·8
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4·4
4·8
3·8
3·5
4·0
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3·5
3·5
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6·6
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2·6
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4·5
3·9
9·2
6·6
4·6
5·0
4·2
4·1
2·7
5·1
2·6
5·3
4·3
3·1
15·9
4·7
7·3
5·6
7·5
4·6
3·4

To follow Wind Chart for June.

Dangerfield Lith. 22, Bedford St. Covent Garden. 14519.

PART III.

SECTION I.

GENERAL SUMMARY FOR THE QUARTER.

There was very little, if any, improvement in the general character of the weather of these three months over that of the quarter which had immediately preceded it. The long series of depressions which had proved such an important factor in the weather of April, May, and June, continued with almost equal persistency till the close of September, and with a similar result; the three months proving to be on the whole both colder and wetter than the corresponding period of any year since 1866, which is the earliest year for which the comparison can be made. One or two of the depressions were deep, and were accompanied by strong gales, and although these were exceptions to the general rule, yet the shallower ones sufficed to keep the weather in a continually unsettled state, with a constantly oscillating barometer. The mean pressure was everywhere below the average in the first two months, and less generally so in September, while the predominant winds over nearly every part of the United Kingdom were Westerly.

July 1st–22nd.—Very disturbed meteorological conditions exhibited themselves all over western Europe on the morning of the 1st. In the west the centre of a moderately deep depression (No. XLVIII.) was travelling in a northerly direction along our western littoral, and under its influence the barometer was falling rapidly at all our stations except those in the extreme south-west, where the minimum had been reached soon after midnight. The highest pressures, which however ranged but little over 30 inches, were reported from eastern Germany and Poland; a large shallow depression lay over Finland and the Gulf of Bothnia, and at the same time readings were low over France and the Peninsula, while over the greater part of the Continent the barometer was still giving way. Strong winds from between South-east and South-west blew over England and in the Channel, accompanied by dull, rainy weather, and low temperature, all over the United Kingdom.

The depression in the west travelled northwards very slowly, and over the north of Scotland no increase of pressure took place for several hours. In the south of England, however, the barometer rose steadily till mid-day of the 2nd, when a fresh brisk fall began in the south-west, consequent upon the approach of a small secondary depression (No. XLIX.), the centre of which passed over the southern counties on the 3rd, and caused a gale along the Channel coasts. In the rear of this disturbance pressure increased generally, with moderate or fresh Westerly winds, and dull, rainy, and unseasonably cold weather.

The region of highest pressure had by this time become transferred to the Peninsula, and, as the last-named depression travelled away across Denmark to the Baltic, gradients became less steep. This condition did not, however, continue long, and a fresh general fall of pressure set in on the 6th, in advance of another series of disturbances. The first of these was an unimportant one, which passed near our north-western coasts during the night of the 6th, or early on the morning of the 7th. It was soon followed by a much larger system (No. L.), which, taking a more easterly course, passed right across Scotland on the 8th, accompanied by steep gradients and strong South-westerly and Westerly winds. The rise of the barometer which succeeded was general, but most marked at the northern stations; the wind veered to North-west and North, but continued strong at some stations, and there was but little, if any, improvement in the weather.

E 53919. 300.—5/88. Wt. 750. E. & S. M

The next depression was a rather large, but shallow, system, which covered most of the British Isles for several hours from the 12th to the 14th, the wind varying in direction with the movement of its centre, but never rising to the force of a gale, while the rainfall was locally heavy, and thunderstorms were experienced in the north. A large depression travelled past our Islands on the 16th, but too far to the westward to affect more than the south-western stations, at which, however, the barometer fell, and the wind rose to a gale. After this gradients again became very slight, and for several hours readings were exceptionally uniform over the whole of western and central Europe, the change being accompanied by a slight improvement in the weather. On the 19th, however, the mercury once more began to give way all over the United Kingdom, and by the following morning the centre of a well-marked depression (No. LIII.) had reached the Irish Sea, from whence it passed across the north of England to the North Sea. This depression was accompanied by strong cyclonic winds and gales, especially to the westward and southward of its centre, and by a good deal of rain; it remained nearly stationary off our eastern coast for some time, and during this interval fresh or strong Northerly winds continued to blow over the British Isles, but the barometer, meanwhile, rose steadily, although with cool, cloudy weather.

July 23rd–31st.—Throughout this interval the barometer was much steadier than it had been during the earlier portion of the month. The depression mentioned at the close of the last paragraph passed away to the Baltic, and ceased to materially affect our weather, and as at the same time an area of relatively high pressure became developed over the Peninsula and France, the winds over Great Britain backed to West and South-west, and decreased in force, while the temperature rose, and the weather improved, although cloud was still rather prevalent. The area of high pressure extended itself eastwards to Germany, and by the close of the period the barometer had become fairly uniform over the greater part of the Continent. Some unimportant low-pressure centres appeared occasionally off our western coasts, but they only affected our weather to the extent of causing the winds to back temporarily to the Southward; on the 31st, however, the barometer gave way pretty generally over the British Isles, in front of a shallow depression (No. LIV.), which was then approaching from the Atlantic, and the weather again became rainy and unsettled.

August 1st–15th.—The barometer rose very generally and briskly on the 1st, as the last-mentioned depression travelled away northwards, and for some hours the weather again improved. Towards the close of the 2nd, however, some unusually severe thunderstorms were developed in different parts of the kingdom, causing some abrupt and peculiar oscillations of pressure, which are well shown on Plate XLIII., by the Falmouth, Stonyhurst, and Kew barometer traces. Following upon this the general distribution of pressure became somewhat changed, and lower readings occurred over the British Isles than those reported from both Scandinavia and south-western Europe. A fresh shallow depression (No. LV.) made its appearance at the mouth of the Channel on the 5th, and, after passing up Saint George's Channel, crossed, in a more easterly direction, to the North Sea, where it remained for some days, and did not finally disappear to the eastward over Russia till the 11th. During most of this interval the movements of the barometer were only slight, but the mercury was low and the weather cold, wet, and unsettled. On the 10th an improvement in the weather took place, and for a day or two it was warm and fine, some comparatively high maximum temperatures being recorded, especially at the north-western stations. Simultaneously a small anticyclone had developed itself over England and the North Sea, but it soon moved away towards Sweden, and in its rear another unfavourable change set in, the weather again becoming unsettled all over the United Kingdom.

August 16th–24th.—The barometer now began to fall somewhat decidedly at all our stations, while higher readings were again reported from the greater part of the Continent. A large but shallow low-pressure system (No. LVI.) reached England on the 16th and caused large falls of rain, especially in the north-west and north, with very dull and disagreeable weather; after remaining almost stationary for several hours it finally travelled away in a north-westerly direction, but in the meantime it had caused the wind at the western and Channel stations to freshen in force, and in places to rise to a gale. This system was immediately followed by others more or less marked in character, and it was not until the 22nd that anything like a general recovery of pressure took place, when the barometer rose at most of our stations as depression No. LVII. passed away to the northward. The general distribution of pressure had by that time undergone a considerable change, and readings were no longer higher over Scandinavia than over Great Britain, the high-pressure area which had existed there having begun to move eastwards and southwards to southern Europe. During the night of the 22nd a very small secondary depression made its appearance at the mouth of the Channel, and caused some heavy falls of rain as it progressed eastwards to the German Ocean, besides delaying the rise of the barometer over the south of England; by the morning of the 24th, however, its centre had reached Denmark, and light airs, with moderately fine weather, had become general over the United Kingdom.

August 25th–31st.—The recovery of pressure proved to be extremely brief. By mid-day on the 24th the barometer had begun to fall again at all our stations, and from this time till the close of the month depressions followed each other in quick succession upon our western and northern coasts, causing continuously strong Westerly and South-westerly winds which sometimes increased to a strong gale in the west and south. The first of these depressions was No. LVIII., the centre of which crossed the extreme north of Scotland during the night of the 25th; it was followed by a slight rise of the barometer, but in a very few hours the mercury was falling again in front of its successor, No. LIX., which skirted our north-western coasts on the 27th, causing South-westerly and Westerly gales along the Channel coasts as well as in the west. Scarcely any increase of pressure occurred between this depression and the next (No. LX.), the deepest and most important of the series, which travelled northwards over Scotland during the night of the 28th, and was accompanied by a very low barometer and steep gradients, and caused a strong gale to blow over almost the whole of England and Ireland.

The barometer now began to rise generally, and at our northern stations, where readings had been lowest, the rise was very brisk. Towards the close of the 29th and throughout the 30th the movement was checked by the approach of depression No. LXI., but as it was only a shallow system no actual fall of the mercury took place, and throughout the 31st the rise went on as briskly as before. All through this interval, till the 31st, the weather was very unsettled, the temperature low,—seldom reaching 70° even over the Midland counties,—and the rainfall heavy and frequent. On the 31st, however, an improvement took place, and for a while the weather became fine and bright.

September 1st–6th.—The improvement in the weather was due to the fact that one of the few anticyclonic systems observed during the quarter had now become extended to the British Isles. On the morning of the 1st its centre covered the greater part of England and Ireland, as well as the Channel and the northern coast of France. Depressions, however, continued to skirt our north-western and northern coasts, some of them (as No. LXIII.) being deep, and consequently the anticyclone soon began to disperse, and the fine weather proved to be very transient. On the 2nd the barometer began again to fall, and the high-pressure system, decreasing in height, extended itself to the Continent, and then moved away towards the Baltic and Russia. In the meantime fresh or strong Westerly winds were occasionally experienced over the northern portion of the British Isles, but in the east and south the winds were moderate in strength throughout, while everywhere the temperature was still low for the time of year. On the 6th the barometer was still falling, the wind was light and generally from the Southward, and the weather was cloudy, with a good deal of rain at some of the western stations.

September 7th–13th.—The fall of the barometer preceded the arrival of depression No. LXIV., which reached Ireland on the 7th, and remained for several hours near the northern coast of that country. On the 8th it moved eastwards, and travelled across the north of England and south of Scotland, its centre apparently passing to the northward of Armagh and

Stonyhurst, but to the southward of Glasgow. On the 9th and 10th a general rise of the barometer took place in its rear, and simultaneously a small high-pressure system began to show itself over the Bay of Biscay and France, the low-pressure centre disappearing over Scandinavia. Fresh depressions, however, quickly succeeded in the west and north-west, and the mercury soon gave way again under their influence, falling very generally until the close of the 12th, when it once more began to recover itself. At that time pressure was relatively high over the Continent, but a large area of low pressure lay over the ocean to the northward and westward of the British Isles, and the weather was still very unsettled. On the 13th, however, the barometer again rose steadily at all our stations.

September 14th–21st.—A short interval of comparatively quiet weather, with equable temperature and but little rainfall, now ensued, the barometer rising till the 15th, and then remaining fairly steady for a few days. An area of relatively high pressure spread itself over England on the 15th and 16th, and although on the 17th still higher readings were reported from Scandinavia, the barometer maintained itself, and on the 19th rose yet higher, upon the development of a second band of high readings on our south-western coasts. On the 20th a fresh series of depressions began to arrive to the northward of our Islands, and soon made themselves felt; the barometer gave way at all stations, but more especially at the northern ones, and the weather again became cloudy, cool, and unsettled.

September 22nd–30th.—The most important depression of this new series (No. LXVII.) reached our north-western coasts during the night of the 22nd, and caused an abrupt fall of the barometer, the mercury at Stornoway, near to which station the centre apparently lay at 8 a.m. on the 23rd, falling an inch and a quarter in a little more than twelve hours. The path of the disturbance lay outside our coasts, and therefore the whole of the system never came under observation; but it was very deep and accompanied by steep gradients, which caused hard Southerly and South-westerly gales on most of our coasts, and by a very heavy fall of rain over the south of England. At the northern stations the barometer rose steadily after the centre of the depression had passed; but in the south-west a shallow secondary showed itself at the close of the 23rd, and during the night travelled across southern England, bringing an increase of wind to the Channel coasts, and causing another slight fall of the barometer over the adjoining regions. In the rear of this, the barometer rose rapidly in the south also, and for several hours the pressure steadily increased, an area of high readings becoming developed over the Bay of Biscay and extending itself thence eastwards over the whole of central Europe, a distribution of pressure which brought another short spell of fine weather to the British Isles. A large area of low pressure still lay, however, over the ocean to the north and west, and on the 27th a new depression approached pretty close to our littoral, causing strong South-westerly winds and a good deal of rain in the north-west. This system was followed by a small secondary (No. LXVIII.) which passed across England on the 28th, and although the barometer rose again on the 29th, with another slight improvement in the weather, the rise was followed by a fresh fall on the following day, which began in the west and soon spread all over the kingdom, causing more unsettled weather and a freshening Southerly wind. The readings of the barometer were at that time uniform, and still relatively high, over the whole of continental Europe, the low-pressure area maintaining itself, and becoming more marked, to the west and north-west of the British Islands.

SECTION II.

Table of Cyclonic Systems.—July, 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. XLVIII. July 1-3.	No. XLIX. July 3-6.	No. L. July 8-10.
Form	Nearly circular	Elongated	At first circular, then elongated.
Size	Very large	Small	Very large.
Depth	Moderate	Shallow	Moderate.
Where first Observed	Over Ireland	South-west of England	To the west of Scotland.
Direction of Motion	Northerly	North-easterly	Easterly.
Rate of Motion	Slow	Slow	Slow.
Regions passed over by Steepest Gradients.	The British Isles, the north of France, and the North Sea and adjacent coasts.	The Channel, the Netherlands, and the southern Baltic.	The British Isles, the north of France, the Netherlands, and the North Sea.
Termination	Disappeared over the ocean to the northward of Scotland.	Passed away over Russia	Disappeared over Russia.
Time under Observation	Rather more than 48 hours	About four days	Nearly three days.
Accompanying Winds	A South-south-east to South-south-west gale, veering to West and North-west and becoming very squally. A South-easterly gale was felt in the south of Norway.	South-westerly to Westerly; moderate to strong.	South-easterly to North-easterly in the north of Scotland, elsewhere Westerly, veering to North-west: fresh in the extreme north, but strong to a gale over the whole of England and Ireland.
„ **Weather**	Unsettled, rainy and squally, with thunder in places; and with very low temperature all over the kingdom.	Cloudy, showery, and squally generally, with heavy rain in the south and south-east of England.	Cloudy and dull, with rain at most stations.
„ **Rainfall**	Very general, and in places, more especially in the north-west, very heavy.	Rain fell all over the kingdom, but the fall was heaviest in the south-east of England.	Pretty general, but heavy at only a few stations.
REMARKS	The centre of this system travelled past the western coasts of Ireland and Scotland, and caused very steep gradients to prevail over the whole of the United Kingdom, the North Sea, and the adjacent coasts. Before it had passed clear of our coasts it was followed by the secondary system No. XLIX., described in the following table.	This system was secondary to No. XLVIII., and made its appearance in the south-west of England during the night of the 2nd, whilst its predecessor still lay near the north-west of Scotland. After travelling across the south of England, it crossed the North Sea to the Baltic, becoming deeper *en route*, and then disappeared over Russia.	For a day or two preceding the arrival of this depression, a band of low readings had stretched from west to east across the region which was afterwards traversed by the centre of this system, and on the 7th a small shallow low-pressure centre passed along our northern coasts, but unaccompanied by strong winds. Along the Channel coasts during the continuance of the present system the wind maintained the strength of a gale for several hours.

TABLE OF CYCLONIC SYSTEMS.—JULY, 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. LI. July 12-16.	No. LII. July 16-17.	No. LIII. July 20-25.
Form	At first circular, then elliptical	Probably circular	Circular
Size	Moderate	Moderate	Large
Depth	Shallow	Shallow	Moderate
Where first Observed	At the entrance to St. George's Channel.	South-west of Ireland	South-west of Ireland
Direction of Motion	Easterly	Easterly	Easterly, then north-easterly
Rate of Motion	At first very slow, afterwards somewhat quicker.	Slow	Slow
Regions passed over by Steepest Gradients.	The British Isles	The south-west of the British Isles and the entrance to the English Channel.	The British Isles, the north of France, and the Netherlands.
Termination	Passed away over Russia	Became filled up over the Channel	Travelled away over Russia
Time under Observation	About three and a half days	About 24 hours	About six days
Accompanying Winds	Easterly over the north of England and Scotland, Westerly in the Channel, becoming Northerly in the rear of the depression; moderate to fresh in force.	Light from North in the east, moderate Easterly winds in the west, and South-easterly to Southerly in the south-west. A hard gale at Scilly.	Easterly in Scotland, Westerly over the south of England, becoming Northerly and North-westerly in the rear of the depression; the force varied from a moderate breeze to a gale.
„ **Weather**	Cloudy and dull, with rain in most districts, and thunderstorms in the north.	Dull and wet in the south-west, generally dull elsewhere, but fine in a few places.	At first very unsettled, cool, and cloudy; afterwards improving considerably.
„ **Rainfall**	Rain fell at most stations, and at a few the fall was very heavy.	Rain fell only in the west and south-west, and not heavily as a rule.	Very general, and in places exceedingly heavy.
REMARKS	This depression was not accompanied by very strong winds, but it caused the weather to continue cold, wet, and unseasonable. Its centre, after crossing central England, travelled over Denmark to the southern Baltic, and thence to Russia, beyond the limit of our observations.	On reaching the vicinity of our coasts, this depression moved very slowly, and became pretty quickly filled up. The barometer was hardly affected by it except at the stations in the south-west.	After reaching the North Sea, this depression remained nearly stationary for several hours, its centre lying not far from the Helder. It then travelled to the Baltic, and again, during three consecutive days, the movements of its centre were only slight, with this exception, that on the 25th the system became broken up into two distinct sub-systems, one of which passed away towards St. Petersburg, while the other remained over the Baltic. On the 26th the latter had also shifted to the Gulf of Finland, and 24 hours later had disappeared over Russia.

TABLE OF CYCLONIC SYSTEMS.—JULY—AUGUST, 1879.

No. LIV. July 31-August 1.	No. LV. August 5-11.	No. LVI. August 15-19.	No. LVII. August 22-23.
Irregular	At first nearly circular, afterwards elliptical.	Irregular	Probably oval.
Large	Large	Large	Large.
Shallow	Shallow	Shallow	Moderate.
Mouth of St. George's Channel	Mouth of the Channel	West of Ireland	Off the west coast of Scotland.
Northerly	Northerly, then easterly	Easterly, then stationary, and afterwards north-westerly.	North-easterly.
Slow	Very slow	Very slow	Slow.
The British Isles	The British Isles and North Sea	The British Isles, northern France, and the North Sea.	The British Isles, the North Sea, and Scandinavia.
Disappeared to the northward of Scotland.	Eventually disappeared over Russia	Partially filled up and then disappeared to the westward of Scotland.	Disappeared over the ocean to the northward of Scotland.
About 36 hours	Nearly seven days	About three and a half days	Less than a day.
North-easterly and Easterly in the north, Southerly in the south, veering generally to South and then to West, but the force nowhere exceeded a fresh breeze.	At first generally Southerly, becoming Easterly and North-easterly in the north, and Westerly and North-westerly elsewhere; moderate to fresh.	At first Southerly, becoming Westerly in the south and North-westerly in the west, but backing to East in the north; force varying from a light breeze to a gale.	Southerly in the north, South-westerly in the south and west, veering to South-west and West generally; moderate to a gale.
At first dull and rainy, then fine generally.	Unsettled, cloudy, and rainy, improving as the depression passed away to the eastward.	Very unsettled, dull, and rainy; very cool for the season.	Moderately fair on the whole, but cloudy and rainy in the north and north-west, and on the 23rd rainy in the south.
General, but heavy at only a few stations.	Very general, and on the shores of St. George's Channel and at the northern stations very heavy.	Rain fell at all our stations, and in many places heavily.	Heavy at some of the southern stations and in Ireland; slight elsewhere.
This was a shallow depression unaccompanied by very strong winds. In its rear the barometer rose briskly, and it was succeeded by a small anticyclone, which, however, remained over the British Isles but a very short time.	This depression appears to have been formed in the neighbourhood of Scilly, and to have become deeper during its progress northward. Until the 8th its advance was not very rapid, and it hung about the neighbourhood of our northern coasts very persistently. On the 8th, however, another area of low pressure had become developed over the Baltic, and the two systems speedily combined, after which the whole system remained for several hours over Sweden and the Baltic, till, on the 11th, it passed eastwards over Russia beyond the limits of our area.	This system grew deeper while it remained over our Islands. On the 18th there were indications of another area of low pressure having arrived near our south-western coasts, travelling to the northward, and the present system, which had by that time become partially filled up, moved towards the north-west, and apparently combining with the new disturbance, disappeared over the ocean.	The centre of this depression kept outside our north-western coasts, just touching our extreme northern stations on the evening of the 22nd. On the morning of the 23rd, however, a small secondary system showed itself at the mouth of the Channel, from whence it moved rather rapidly eastwards towards Denmark and the Baltic. It was the latter system which was accompanied by the heavy rainfall at the Channel stations.

TABLE OF CYCLONIC SYSTEMS.—AUGUST, 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. LVIII. August 25-26.	No. LIX. August 27-28.	No. LX. August 28-29.
Form	Circular	Probably circular	Probably circular
Size	Large	Very large	Very large
Depth	Moderate	Moderate	Deep
Where first Observed	Near the Hebrides	Off the north-west coast of Ireland	To the north-west of Ireland
Direction of Motion	Easterly	Northerly	North-north-easterly
Rate of Motion	Slow	Moderate	Moderate
Regions passed over by Steepest Gradients.	The British Isles and north of France, the North Sea, and the Netherlands.	The British Isles, the north of France, the North Sea, and adjacent coasts.	The British Isles and North Sea
Termination	Apparently became filled up near the coast of Norway.	Disappeared to the northward of Scotland.	Disappeared to the northward of Scotland.
Time under Observation	Rather more than 24 hours	Less than a day	Less than a day
Accompanying Winds	At first South-easterly in north of Scotland, South-westerly elsewhere, becoming Westerly and North-westerly; strong everywhere, but rising to a gale in the west.	Southerly and South-westerly, veering to West; force varying from a strong breeze to a fresh gale.	South-westerly, veering to West, and in Scotland to North-west and North; a strong gale over the greater part of the kingdom.
„ Weather	Squally and dull, with a good deal of rain at the northern stations.	Overcast and squally, with a good deal of rain.	Rainy over England, dull elsewhere; becoming clear and fine later on.
„ Rainfall	Rain fell very generally, but heavily at only a few stations.	Very general, and in the west very heavy.	Rain fell at most stations, and most heavily in the south and west; the fall was nowhere excessive.
REMARKS	After reaching the North Sea, the easterly progress of this depression appears to have become arrested. Its centre apparently lay over that region during a considerable part of the 26th, and seems to have become partially filled up in the meanwhile, but after the close of the day it quite disappeared from our area.	The centre of this depression was near the Hebrides at the close of the 27th, but the track lay for the most part quite outside our western littoral. By the morning of the 28th it had gained the ocean to the northward of Scotland, and passed beyond the limits of our observations.	The centre of this depression passed very near to Glasgow during the night of the 28th; its track afterwards, however, lay to the westward of Norway, and therefore only a portion of the system is shown on the chart for the morning of the 29th, and the details as to its size and shape are to some extent doubtful.

TABLE OF CYCLONIC SYSTEMS.—AUGUST—SEPTEMBER 1879.

No. LXI. August 30–September 1.	No. LXII. September 2-3.	No. LXIII. September 3-5.
Circular	Doubtful	Probably circular.
Moderate	Large	Large.
Shallow	Probably moderate	Deep.
Over the north of Scotland	On the north-west coast of Norway	North-west coast of Norway.
East-north-easterly	Probably north-easterly	Probably north-easterly.
Slow	Doubtful	Doubtful.
The British Isles and North Sea	The British Isles, North Sea, and Scandinavia	The North Sea and Scandinavia.
Disappeared beyond the Gulf of Bothnia	Disappeared over northern Europe	Disappeared over Lapland.
Nearly two days	About one day	About one and a half days.
Southerly in Scotland, South-westerly elsewhere, veering to West and North-west; moderate or fresh in force.	South-westerly to Westerly, strong to a gale in the North and West, but light along the Channel coasts.	Moderate to fresh Westerly winds in Scotland, but light over England. A strong Westerly gale prevailed over Scandinavia and the Baltic.
At first rainy and unsettled in the north-west, but fine elsewhere; rain spreading, with thunderstorms. Afterwards much finer generally.	Dull and unsettled in the north and north-west, with rain; but fine in the south and south-east.	At first dull and rainy in the north and west, but soon clearing up; elsewhere generally fine.
Rain pretty general, except in the south and south-east of England.	Rain fell only in the north and west, and the fall was nowhere heavy.	Very moderate in amount, and confined to the northern and western stations.
This depression, although well defined, was shallow, and unaccompanied by very strong winds. At the southern stations it was unaccompanied by a fall of the barometer, although it served to check for a while the rise of the mercury which had succeeded the passage of the previous system.	An anticyclone lay over Great Britain at the time when this disturbance entered our area. The system kept to the north-west of our coasts, and therefore little can be ascertained of its shape and size; but it caused the barometer to give way in the north, and steepened the gradients so much that the wind rose to a gale at most of the northern and north-western stations.	This system followed very closely upon its predecessor, and travelled along a similar track. It appears, however, to have been deeper, and although the accompanying winds over the northern portion of Great Britain were less strong than in the preceding case, they were very strong over the whole of Scandinavia. As the path of the depression lay mainly over the ocean, some of the details of the system are more or less doubtful.

TABLE OF CYCLONIC SYSTEMS.—SEPTEMBER 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. LXIV. September 7-10.	No. LXV. September 11-12.
Form	Circular	Doubtful
Size	Large	Large
Depth	Moderate	Moderate
Where first observed	Over Ireland	Off the north-western coasts of Great Britain
Direction of Motion	At first northerly, then easterly	Apparently northerly
Rate of Motion	Slow	Slow
Regions passed over by steepest Gradients	The British Isles	The British Isles and the North Sea
Termination	Became filled up over Scandinavia	Disappeared to the northward of Scotland
Time under Observation	Three days	About one day
Accompanying Winds	Southerly, veering to South-west, and later to West, in the south and west, and backing to South-east and East in the north; afterwards becoming generally North-westerly; strong generally, but rising to a gale at the western stations.	Generally South-westerly, moderate, but fresh or strong in places; veering during the day to West at the western and north-western stations.
„ **Weather**	Dull and unsettled, with rain, and in some places, thunder.	Dull, unsettled, and rainy over the greater part of the kingdom; clearing up in the west towards the close of the day.
„ **Rainfall**	Rain fell generally, and at some of the western and north-western stations the fall was very heavy.	General, except in the north-east, and heavy at some of the western stations.
REMARKS	This depression when it first appeared was somewhat shallow, and travelling in a northerly direction, it kept to the westward of England and Scotland. By the 8th, however, it had grown much deeper, and then changing its course, it travelled to the eastward, and crossed over the northern half of England to the North Sea, and thence to Denmark and Sweden, where it apparently became filled up and disappeared. At the time it reached Sweden another disturbance made its appearance over the extreme north of Norway and Lapland.	This depression was another of the series at this time skirting our north-western coasts. Its centre kept entirely to the westward of Scotland and therefore nothing definite is known of its shape and of other particulars; but there is reason to suppose that there were really two depressions, following each other very closely, the second one affecting the barometers at our northern stations rather more than the first.

Table of Cyclonic Systems.—September 1879.

No. LXVI. September 21-22.	No. LXVII. September 22-23.	No. LXVIII. September 27-28.
Doubtful	Probably circular	Irregular.
Moderate	Very large	Very small.
Shallow	Very deep	Shallow.
Near the Hebrides	Off our north-western coasts	Over Ireland.
North-easterly	Northerly	Easterly.
Slow	Probably moderate	Slow.
The British Isles	Steepest over Scotland and north of Ireland	The British Isles and the North Sea.
Disappeared off the Norwegian coast	Passed away to the northward of Scotland	Became filled up over the North Sea.
About one day	Less than 24 hours	About 24 hours.
Southerly on our eastern coasts and Westerly elsewhere, veering on the 22nd to West-north-west and North-west; strong in the north, but moderate elsewhere.	Westerly backing to South and again veering to West; a strong Southerly gale blew at all the western and northern stations, and at most other stations the wind rose to a moderate gale.	Fresh Southerly winds, rising to a gale at some exposed western stations, and then veering to West and North-west, and moderating.
Fine in the north and east, cloudy or dull elsewhere; later on rainy in Scotland, and in the north-east of England also.	Stormy, wet, and unsettled in all parts of the kingdom.	At first fine in the east, but wet in the west, becoming generally dull, unsettled, and rainy, with thunder in the north-west.
No rain fell in the south-east of England, but elsewhere it was pretty general, though not heavy.	Rain fell generally, but not very heavily in front of the depression. Very heavy falls were recorded over southern England as the depression was passing away.	Rather heavy in the west on the 27th, but none in the east; on the 28th the fall was more general, and was heaviest in the south of England.
This depression was secondary to a much larger system which passed outside our northern shores on the 20th, causing the barometer to fall at the northern stations, but not otherwise materially affecting the weather of the British Isles. The present system was also chiefly felt in the north, its centre passing, probably, beyond the mainland of Scotland. On the morning of the 22nd it had become somewhat V-shaped in form.	This was an unusually deep depression, and, the accompanying gradients being very steep, the wind blew strongly all over the kingdom. The centre of the system, however, only skirted our north-western coasts and it was therefore in Scotland and the north of Ireland that the gale was most strongly felt. Before the close of the 23rd the centre had disappeared over the ocean, and gradients had become much less steep; but some shallow secondary systems were then beginning to show themselves over England, and these caused a good deal of rain and dull, unsettled weather.	This depression was secondary to the main disturbance, which, having skirted our extreme north-western coasts on the 27th, disappeared to the northward of Scotland on the 28th; the accompanying fall of the barometer, was not large, and the winds were only locally strong, but the weather became generally dull and unsettled over the greater part of western Europe.

TABLES OF GALES.

No. 17. (Cyclonic System, No. LIII.)

Stations.	Velocity 30-40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour.				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks.
	Commenced.	Direction of Wind.	Commenced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
July 20-22, 1879.													
Aberdeen	6 p.m. (21st).	N.W.	—	—	—	—	1 a.m. (22nd).	N.W.b.N.	7	9 p.m. & Midt. (21st).	N.W.	36	—
Seaham	9 a.m. (21st).	N.	11 a.m. (21st). 3 p.m. (21st). 5 p.m. (21st). 1 a.m. (22nd). 8 a.m. (22nd). Noon (22nd).	N. N. N. N. N. N. by E.	40 43 42 42 41 41	3 1 7 5 3 2	5 p.m. (22nd).	N.	32	8 p.m. (21st).	N.	46	—
Holyhead.	Noon (20th).	W. by N.	2 p.m. (20th).	W.	47	6	6 p.m. (21st).	N.W.	30	4 p.m. (20th).	N.W.	53	—
	7 p.m. (21st).	N.W.	1 a.m. (22nd). 3 a.m. (22nd).	N.W. N.W.b.N.	40 42	1 8	11 a.m. (22nd).	N.W.	16	4 & 7 a.m. (22nd).	N.W.b.N.	45	—
Falmouth.	3 a.m. (20th).	S.W.	10 a.m. (20th).	W. by N.	46	8	11 p.m. (20th).	W.N.W.	20	2 p.m. (20th).	W. by N.	49	—
	6 a.m. (21st).	W. by N.	—	—	—	—	9 a.m. (21st).	W.N.W.	3	6 & 7 a.m. (21st). 8 a.m. (21st).	W. by N. W.N.W.	30	—
	10 a.m. (21st).	W.N.W.	—	—	—	—	9 p.m. (21st).	W.N.W.	11	Noon & 5 p.m. (21st).	W.N.W.	35	—
	9 a.m. (22nd).	N.W.	—	—	—	—	8 p.m. (22nd).	N.W.	11	11 a.m. (22nd).	N.W.	35	—
Yarmouth	10 a.m. (20th).	S. by E.	—	—	—	—	2 p.m. (20th).	S.	4	11 a.m. (20th).	S.	38	—

No. 18. (Cyclonic System, No. LX.)

Stations.	Velocity 30-40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour.				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks.
	Commenced.	Direction of Wind.	Commenced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
Aug. 28-29, 1879.													
Alnwick Castle.	11 p.m. (28th).	S.S.W.	1 a.m. (29th).	W.S.W.	45	1	8 a.m. (29th).	W.	9	1 a.m. (29th).	W.S.W.	45	30 miles were also recorded at 11 a.m., 1 p.m., and 3 p.m. 29th.
Holyhead	5 a.m. (28th).	S.S.W.	2 p.m. (28th).	S.S.W.	46	10	11 a.m. (29th).	S.W.	30	7 p.m. (28th).	S.S.W.	51	—
Armagh -	6 p.m. (28th).	S.S.W.	—	—	—	—	9 p.m. (28th).	S.W.b.W.	3	7 p.m. (28th).	S.S.W.	34	—
Valencia -	2 a.m. (28th).	S.S.W.	7 a.m. (28th).	S.W.byS.	51	10	6 p.m. (28th).	W.S.W.	16	1 p.m. (28th).	S.W. by S.	62	30 miles were registered at 7 p.m., and 32 miles at Midt. 28th.
Falmouth	11 a.m. (28th).	S.W.	—	—	—	—	6 a.m. (29th).	W.S.W.	19	5 p.m. (28th).	S.W.	39	—

No. 19. (Cyclonic System, No. LXII.)

Sept. 2-3, 1879.													
Sandwick.	10 a.m. (2nd).	S.W.byW.	—	—	—	—	1 p.m. (2nd).	W.S.W.	3	10 a.m. (2nd).	S.W.byW.	37	—
	5 p.m. (2nd).	W.S.W.	—	—	—	—	10 p.m. (2nd).	W. by S.	5	6 p.m. (2nd).	W. by S.	39	—
	5 p.m. (3rd).	W. by S.	9 p.m. (3rd).	W. by S.	42	7	6 a.m. (4th).	W.N.W.	13	9 p.m. (3rd).	W. by S.	46	—
Glasgow	11 a.m. (2nd).	S.W.	—	—	—	—	3 p.m. (2nd).	S.W.	4	2 p.m. (2nd).	S.W.	35	
Alnwick Castle.	5 a.m. (2nd).	s.w.bys.	9 a.m. (2nd). 5 a.m. (3rd). 11 a.m. (3rd).	W.S.W. W. by S. S.W.byW.	50 43 44	19 4 7	8 p.m. (3rd).	W. by S.	39	Noon (2nd).	W.S.W.	60	—
Holyhead.	4 a.m. (2nd).	S.W. by S.	2 p.m. (2nd).	S.S.W.	41	1	Midt. (2nd).	S.S.W.	20	2 p.m. (2nd).	S.S.W.	41	—
	3 a.m. (3rd).	S.S.W.	11 a.m. (3rd).	S.S.W.	41	1	7 p.m. (3rd).	S.W. by S.	16	11 a.m. (3rd).	S.S.W.	41	—
Valencia	11 a.m. (2nd).	S.W.	—	—	—	—	6 p.m. (2nd).	S.W. by S.	7	1 p.m. (2nd).	S.W. by S.	38	30 miles were also recorded at a few other hours on 2nd and 3rd.

No. 20. (CYCLONIC SYSTEM, No. LXVII.)

Stations.	Velocity 30-40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour.				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks
	Commenced.	Direction of Wind.	Commenced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
Sept. 22-24, 1879.													
Sandwick.	Midt. (22nd).	S.E. by S.	3 a.m. (23rd).	S.E.	48	12	6 p.m. (23rd).	S.S.W.	18	6 a.m. (23rd).	S.E.	52	—
	7 p.m. (23rd).	S.W. by W.	—	—	—	—	9 a.m. (24th).	W.S.W.	14	8&9p.m. (23rd).	S.W. by W.	37	—
	11 a.m. (24th).	W.S.W.	—	—	—	—	4 p.m. (24th).	W. by S.	5	2 p.m. (24th).	W. by S.	36	—
Aberdeen.	2 a.m. (23rd).	S. by E.	—	—	—	—	7 a.m. (23rd).	S.	5	4 a.m. (23rd).	S.S.E.	38	—
	11 a.m. (23rd).	S.W. by S.	—	—	—	—	3 p.m. (23rd).	S.S.W.	4	Noon (23rd).	S.W. by S.	38	—
Glasgow	4 a.m. (23rd).	S.W.	—	—	—	—	2 p.m. (23rd).	W.S.W.	10	11 a.m. (23rd).	S.W.	37	—
Alnwick Castle.	10 a.m. (23rd).	S.W.	—	—	—	—	6 p.m. (23rd).	S.W. by W.	8	Noon & 2 p.m. (23rd).	S.W. by W.	39	—
Stonyhurst.	2 a.m. (23rd).	S.S.E.	—	—	—	—	6 a.m. (23rd).	S.W.	4	3 a.m. (23rd).	S. by E.	37	—
Holyhead	7 p.m. (22nd).	S.	9 p.m. (22nd).	S. by E.	52	7	5 a.m. (23rd).	W.	10	Midt. (22nd).	S. by E.	59	—
Valencia	1 p.m. (22nd).	S. by W.	3 p.m. (22nd).	S.	45	7	11 p.m. (22nd).	W. by S.	10	7 p.m. (22nd).	S. by W.	52	—
Falmouth	11 p.m. (22nd).	S. by W.	—	—	—	—	5 a.m. (23rd).	W.S.W.	6	3 a.m. (23rd).	S.S.W.	38	—

TABLE OF ANTICYCLONIC SYSTEMS.—JULY—SEPTEMBER 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. XV. July 23-31.	No. XVI. August 30—September 7.	No. XVII. September 19-21.	No. XVIII. September 25-30.
Form	Irregular	Variable, but as a rule elongated.	Irregular	Irregular.
Size	Large	Large	Large	Large.
Height	Small; maximum readings 30·3 ins. on 28th.	Moderate; maximum readings 30·5 ins. on 1st.	Very small	Small.
Where first Observed	Over the Peninsula	France and Germany	Over Ireland	Bay of Biscay.
Direction of Motion	At first northerly, then easterly.	North-easterly	Easterly, then southerly	Easterly.
Rate of Motion	Very slow	Very slow	Slow	Slow.
Regions passed over	The Bay of Biscay, France, and Germany.	The British Isles, France, Germany, and the Baltic Provinces.	The British Isles, France, and the Bay of Biscay.	France, Germany, and Russia.
Termination	Became dispersed over central Europe.	Disappeared over northern Russia.	Disappeared over the Peninsula.	Disappeared over eastern Europe.
Accompanying Wind	Northerly, backing to West and then to South, and varying in force from a light to moderate, or fresh breeze.	South-westerly to Westerly, moderate to strong; then Easterly and South-easterly, followed again by South-westerly winds, blowing strongly in the west.	Northerly, light; backing to South-west and South, and freshening; then veering again to West and North-west.	Moderate to light Westerly winds, backing to South-west and South, and freshening.
" Weather	Rather variable; but on the whole dull, with a good deal of rain, over the British Isles,	Very changeable, but on the whole fair, except in the west and north; a good deal of rain in the west during last two or three days.	Generally cloudy or dull, with a little rain at a few stations.	At first generally fine, afterwards becoming dull, with rain at most of our western stations.
REMARKS	After remaining for some days over France, this system moved on the 26th rather briskly to the eastward, probably under the influence of a depression then passing to the northward of Scotland. On the 27th, however, its centre was again transferred to France, from whence it moved more slowly to the eastward once more, and finally became dispersed over central Europe.	This system first showed itself over France and Germany, from whence it became extended to the British Isles. The centre then moved back again to the Continent and decreased in height, and after again stretching out to the westward for a few hours it moved off towards the Baltic, and finally disappeared over north-eastern Russia.	This system was very short-lived, and almost as soon as it had become fairly developed over Great Britain it began to give way under the influence of depression No. LXVI., which made its appearance to the northward of Scotland. In moving southwards, however, the system became temporarily extended over France and Germany.	An area of high pressure existed over eastern Russia at the time that this system made its appearance to the westward of France. The two appear to have become united on the 27th, and for several hours a band of high readings stretched right across the Continent. The barometer soon gave way, however, in the west, and gradually the anticyclone became entirely transferred to Russia, and by the close of the month it had almost entirely disappeared from our area.

NOTES to accompany the ANTICYCLONIC TABLES.

July 1st–22nd.—During the first half of this period the highest barometer readings were generally reported from the Peninsula, from whence a band of relatively high pressure extended itself on the 8th and 9th over the Mediterranean. On the 12th the highest pressures became transferred to central Europe, and from that time till the close of the interval they remained as a rule near that region, although, owing to the quick succession of disturbances which reached north-western Europe, their position from day to day was very changeable.

August 1st–29th.—The *locale* of the highest pressures varied a good deal during this interval. At first the barometer was relatively high and fairly uniform over the greater part of the Continent, and for a few hours on the 2nd the high readings extended over the British Isles also. The approach of some depressions from the westward, however, caused the mercury to give way there very soon, and gradually the highest pressures receded to the south of Europe, where they continued for a few days. On the 11th they had again moved northwards to southern Germany, and next day they had become expanded into a broad band which embraced the whole of Germany, the North Sea, and Scandinavia. Shortly after this readings again became fairly uniform over most of Continental Europe, till on the 16th they became split up into two distinct areas of relatively high pressure, one over northern Scandinavia and the other covering the greater part of France and the Peninsula, the two being divided by a band of lower readings stretching eastwards from the British Isles. In a day or two this band disappeared, and on the 20th the highest readings were again found over central Europe, from whence they moved first to the eastward over Russia, and then southwards to southern Europe and the Peninsula, where they continued during the remainder of this interval, moving, however, somewhat to the northward towards its close.

September 8th–18th.—During this interval pressure was fairly uniform over southern, central, and eastern Europe, the highest readings lying as a rule near the Peninsula during the first part of the period, but shifting across Germany to Russia towards its close.

September 21st–24th.—During this short interval pressure was again uniform and relatively high over the greater part of Continental Europe; an area of low readings existing in the neighbourhood of the British Isles and Scandinavia.

SECTION III.

REMARKS FOR JULY 1879.

(*Tables A. to C., July, with Monthly Wind and Weather Charts.*)

Wind.—The prevailing winds at the English and Irish stations were from between North-west and South-west; in the south of Scotland and north of England the observations were more evenly distributed round the compass, but still with a slight predominance of Westerly winds; at the more northern stations, however, the direction was chiefly Northerly and Easterly, the number of observations from Westerly points being relatively very small.

During the first few days the direction of the wind was governed by a depression which passed close to our north-western coasts. Easterly winds were therefore experienced in the extreme north, and South-easterly on the east coasts, while over the greater part of England and Ireland the direction varied from South-west to West, veering in places to North-west, the force varying from a gale to a moderate or strong breeze. By the close of the 4th North-westerly and Westerly winds had become general, but on the 6th they backed again, and South-easterly winds appeared in the north-west, while strong South-west winds, which soon veered to West, spread over the greater part of the United Kingdom. Very little further change took place till the 9th, except that Easterly winds were again felt for a little while in the north; on that day, however, the direction became Northerly at the northern stations, and for a day or two moderate Northerly or North-westerly winds prevailed generally. On the 11th another retrograde movement took place, and after a few hours of variable airs a South wind became general, backing to East, and later on to North and North-west, everywhere except in the south and south-west of the British Isles, in which region the wind veered. The next important change took place on the 15th, when again a Southerly current became established for a short time, but two days later light variable airs, chiefly from the Eastward, set in, and after continuing for a day or two shifted to the Southward, and increased somewhat in force. A depression crossed over England on the 20th, and a very complete cyclonic wind-circulation was observed in connexion with it, but in its rear strong to moderate Northerly and North-westerly winds set in, and continued till the 23rd. The wind then backed, and moderate Westerly breezes ensued for some days, till on the 29th they backed still more to South-west and South for a few hours, and then became light and rather variable in direction. On the 31st an Easterly breeze had again set in at the northern stations, while over England a light or moderate Southerly wind was blowing, and in the extreme west the direction was Northerly.

Pressure.—The mean pressure for the month was everywhere considerably below the average, although the distribution, as shown by the monthly chart, was normal. The defect varied in amount from nearly ·2 inch in the north of Scotland to upwards of ·1 inch at the south-western stations. The range of pressure was considerable for July, although no very high readings were attained; in the south of England it amounted to between eight and nine tenths of an inch, while elsewhere it exceeded an inch, and at Armagh amounted to 1·143 inch. The minima occurred over nearly the whole kingdom on the 1st or 2nd, in connexion with depression No. XLVIII.; while the maxima occurred on varying dates between the 18th and 28th; the latter amounted to 30·2 inches in the south-west of England, but further north they only slightly exceeded 30·0 inches.

Movements of the Depressions.—Depressions were of very frequent occurrence during the month, and while in several instances their centres passed in a northerly direction outside our coasts, in several others they followed a more easterly course and passed right over the

British Isles, causing a good deal of unsettled and unseasonable weather. The only anticyclonic system which reached our shores during the month was a small one observed during the latter half of the period over France and adjoining regions, and which occasionally became extended to our southern coasts.

Temperature.—The temperature was exceptionally low all through the month, the means being below the average all over the United Kingdom; in the south of England the defect amounted to about 5°, which decreased towards the north, till in the north of Scotland it amounted to between 2° and 3°. The mean values over the former district and the English Midlands were without exception below 60°, and over the greater part of Scotland they but slightly exceeded 55°. The range of temperature was not great, and rarely exceeded 30°, at many stations indeed it did not amount to 20°, and at Pembroke the difference between the maximum and minimum of the month was only 15°. The highest temperatures were generally recorded between the 28th and 30th; at a few inland stations 80° was reached, but at many coast stations the mercury never attained 70°. The minima were most commonly reached on the 11th or 12th, but the 2nd and 3rd was also a cold period, and over a considerable portion of Ireland the lowest temperatures were recorded on the 27th just before the maxima were observed in the same districts.

Vapour Tension.—The tension of aqueous vapour in the air was rather high, the mean values ranging from ·42 inch at several southern stations to ·33 inch in the north of Scotland, the decrease northwards being fairly uniform. The *Relative Humidity* was somewhat irregular in its distribution, but the differences were not large, the mean values ranging from 90 per cent. to 80 per cent.

Rainfall.—The month was a very wet one, the rainfall being largely in excess of the average at nearly every station in the British Isles, and amounting in some instances to nearly double the normal amount. There were some heavy falls exceeding an inch in the 24 hours, but the large totals were due less to this cause than to the persistently wet weather experienced. The heaviest falls were generally recorded about the 20th, but in some districts they occurred quite at the beginning of the month.

TABLE A., JULY.—SHOWING the MEAN and EXTREME PRESSURES and TEMPERATURES recorded at each of the SEVEN SELF-RECORDING OBSERVATORIES of the METEOROLOGICAL OFFICE during the Month of JULY 1879; together with the MONTHLY VAPOUR TENSION, the RELATIVE HUMIDITY, and TOTAL RAINFALL.

NAMES OF OBSERVATORIES.	PRESSURE at 32° F. and the Mean Sea Level (In English Inches).						TEMPERATURE in the Shade (In Degrees Fahrenheit).						HYGROMETRIC VALUES.		RAINFALL (In English Inches).
	Mean for the Month.	Extremes.				Range.	Mean for the Month.	Extremes.				Range.	Tension of Vapour (In English Inches).	Relative Humidity (Saturation=100).	
		Minimum.		Maximum.				Minimum.		Maximum.					
		Reading.	Date.	Reading.	Date.			Reading.	Date.	Reading.	Date.				
	ins.	ins.	D. H.	ins.	D. H.	ins.	°	°	D. H.	°	D. H.	°	in.	%	ins.
Valencia - -	29·853	29·140	1st, 1 a.m.	30·157	22nd, 10 p.m. 11 p.m.	1·017	55·5	48·3	10th, Midt. 11th, 0.25 a.m.	64·9	30th, 7 p.m.	16·6	·378	86	4·230
Armagh - -	·753*	28·926	1st, 6 p.m.	·069	22nd, 10 p.m. 11 p.m. 23rd, 8 a.m.	1·143	55·0	48·0	3rd, 4 a.m. 27th, 4 a.m.	67·5	29th, 3 p.m.	19·5	·378	88	5·170
Glasgow - -	·687	·950	2nd, 1 a.m. 2 a.m.	·030	18th, 8 a.m.	1·070	54·9	46·5	12th, 4 a.m.	71·5	22nd, 3 p.m.	25·0	·340	80	4·741
Aberdeen - -	·695	28·921	2nd, 5 p.m.	·053	18th, 11 a.m.	1·132	53·2	44·3	15th, Midt.	69·4	29th, 4 p.m.	25·1	·330	81	3·925
Falmouth - -	·885	29·369	1st, 6 a.m. 7 a.m.	·238	24th, 10 p.m. 11 p.m.	0·869	57·2	50·8	5th, 4 a.m.	68·2	18th, 1 p.m.	17·4	·397	85	4·665
Stonyhurst - -	·735	·050	2nd, 1 a.m.	·081	28th, 10 p.m.	1·031	55·7	45·1	11th, 2 a.m.	71·5	29th, Noon	26·4	·368	83	6·703
Kew - -	29·805	29·303	20th, 8 p.m.	30·177	28th, 10 a.m. 11 a.m. 1 p.m.	0·874	58·4	48·0	11th, 3 a.m.	77·0	29th, 2 p.m.	29·0	·399	81	4·080

* Mean for one day is approximate.

TABLE B., JULY.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at
The values are not

(The Stations are grouped in Districts, and then arranged in order of

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 9 a.m. and 9 p.m.	AIR TEMPERATURE.									
			At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Means of			Absolute Extremes.			
						Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.
		ins.	°	°	°	°	°	°	°		°	
0. SCOTLAND, N.	Orkneys (Sandwick Manse)	29·684	53·1	51·9	52·5	48·9	57·2	53·1	45·8	11th	63·2	29th
1. SCOTLAND, E.	Glenalmond	29·700	54·2	51·8	53·0	48·1	59·3	53·7	40·3	11th	68·5	22nd
2. ENGLAND, N.E.	Seaham	29·698	56·5	53·4	55·0	50·0	61·4	55·7	42·8	16th	74·6	29th
	Durham*	29·700	57·4	52·7	55·1	49·7	63·0	56·4	45·4	24th	75·3	30th
	Hull	29·743	58·3	55·6	57·0	51·7	65·1	58·4	46·0	12th	77·8	28th
	Kelstern 𝔐	29·751	56·8	53·3	55·1	49·4	63·7	56·6	42·9	12th	75·9	30th
3. ENGLAND, E.	Hillington 𝔐	29·759	59·0	54·7	56·9	50·2	65·8	58·0	43·1	25th	80·2	29th
	Audley End (Saffron Walden) 𝔐	29·779	58·9	55·5	57·2	51·2	64·6	57·9	45·2	12th, 16th	78·1	30th
	Chigwell Row	29·833	58·3	56·4	57·4	51·5	63·6	57·6	46·2	11th	75·3	30th
4. MIDLAND COUNTIES.	Wakefield 𝔐	29·744	57·5	56·0	56·8	51·7	62·9	57·3	41·4	12th	75·4	28th
	Buxton 𝔐	29·779	54·1	52·2	53·2	48·7	60·5	54·6	40·9	12th	71·3	28th
	Cheadle 𝔐	29·759	54·5	53·9	54·2	49·8	61·3	55·6	45·0	11th	72·2	28th
	Leicester	29·767	58·7	57·1	57·9	51·5	64·2	57·9	46·5	11th	75·6	29th
	Uppingham	29·764	57·3	54·1	55·7	50·2	64·1	57·2	44·8	11th	74·8	28th
	Oscott	29·767	57·2	55·1	56·2	50·4	63·6	57·0	44·8	11th	75·3	29th
	Churchstoke 𝔐	29·793	56·6	54·8	55·7	50·8	62·1	56·5	47·5	6th, 26th	73·5	28th
	Cheltenham 𝔐	29·795	59·0	56·5	57·8	51·5	65·1	58·3	44·0	11th	77·0	29th
5. ENGLAND, S.	Marlborough 𝔐	29·825	57·6	55·3	56·5	51·5	65·2	58·4	44·0	11th	77·5	29th
	Strathfield Turgiss 𝔐	29·821	59·5	55·8	57·7	50·9	66·3	58·6	43·9	11th	79·6	29th
	Ramsgate 𝔐	29·838	59·4	56·6	58·0	52·6	64·1	58·4	47·1	6th, 11th	79·2	30th
	Folkestone	29·825	59·0	56·0	57·5	52·0	63·0	57·5	45·5	11th	75·6	30th
	Southampton	29·830	58·6	56·7	57·7	52·7	64·6	58·7	46·8	11th	77·0	29th
	Hastings	29·835	58·5	55·9	57·2	52·5	62·5	57·5	46·1	11th	74·4	29th
6. SCOTLAND, W.	Laudale	29·695	54·3	53·2	53·8	49·2	60·5	54·9	43·0	3rd	65·2	28th
7. ENGLAND, N.W.	Douglas (I. of Man)	29·727	55·1	53·0	54·1	51·0	58·8	54·9	48·2	3rd	64·4	17th
	Llandudno 𝔐	29·756	57·0	55·7	56·4	53·1	61·3	57·2	50·0	2nd, 11th	74·4	29th
8. ENGLAND, S.W.	St. David's	29·815	56·4	54·5	55·5	52·3	60·2	56·3	48·7	3rd	68·9	18th
	Caermarthen 𝔐	29·810	57·7	55·0	56·4	51·8	64·2	58·0	46·8	11th	75·8	29th
	Dartmoor 𝔐	29·859	51·7	51·1	51·4	48·1	57·1	52·0	45·1	2nd, 3rd	71·2	29th
	Babbacombe 𝔐	29·859	58·3	54·6	56·5	51·9	63·6	57·8	47·6	11th	70·6	23rd
9. IRELAND, N.	Londonderry	29·730	55·8	54·2	55·0	51·1	60·2	55·7	46·4	15th	67·1	29th
	Brookeborough	29·727	54·6	54·1	54·4	49·7	61·3	55·5	44·4	27th	83·4	30th
	Markree Castle	—	55·4	53·4	54·4	49·5	60·7	55·1	40·8	27th	68·3	28th
10. IRELAND, S.	Dublin	29·780	57·4	55·9	56·7	52·3	62·1	57·2	48·1	27th	73·6	28th
	Parsonstown	29·804	56·4	54·5	55·5	50·8	61·7	56·3	44·6	27th	69·6	18th
CHANNEL	Jersey (St. Aubin's)	29·937	58·8	56·2	57·5	53·5	63·8	58·7	49·5	2nd	79·4	29th

NOTE.—The stations marked thus 𝔐 are in connection with the Royal Meteorological Society.

* At Durham the observations were taken at 10 a.m. and 10 p.m. each day.

STATIONS of the SECOND ORDER in the BRITISH ISLANDS, during the Month of JULY 1879.
corrected for Diurnal Range.

Latitude, beginning in each case with the Station lying furthest North.)

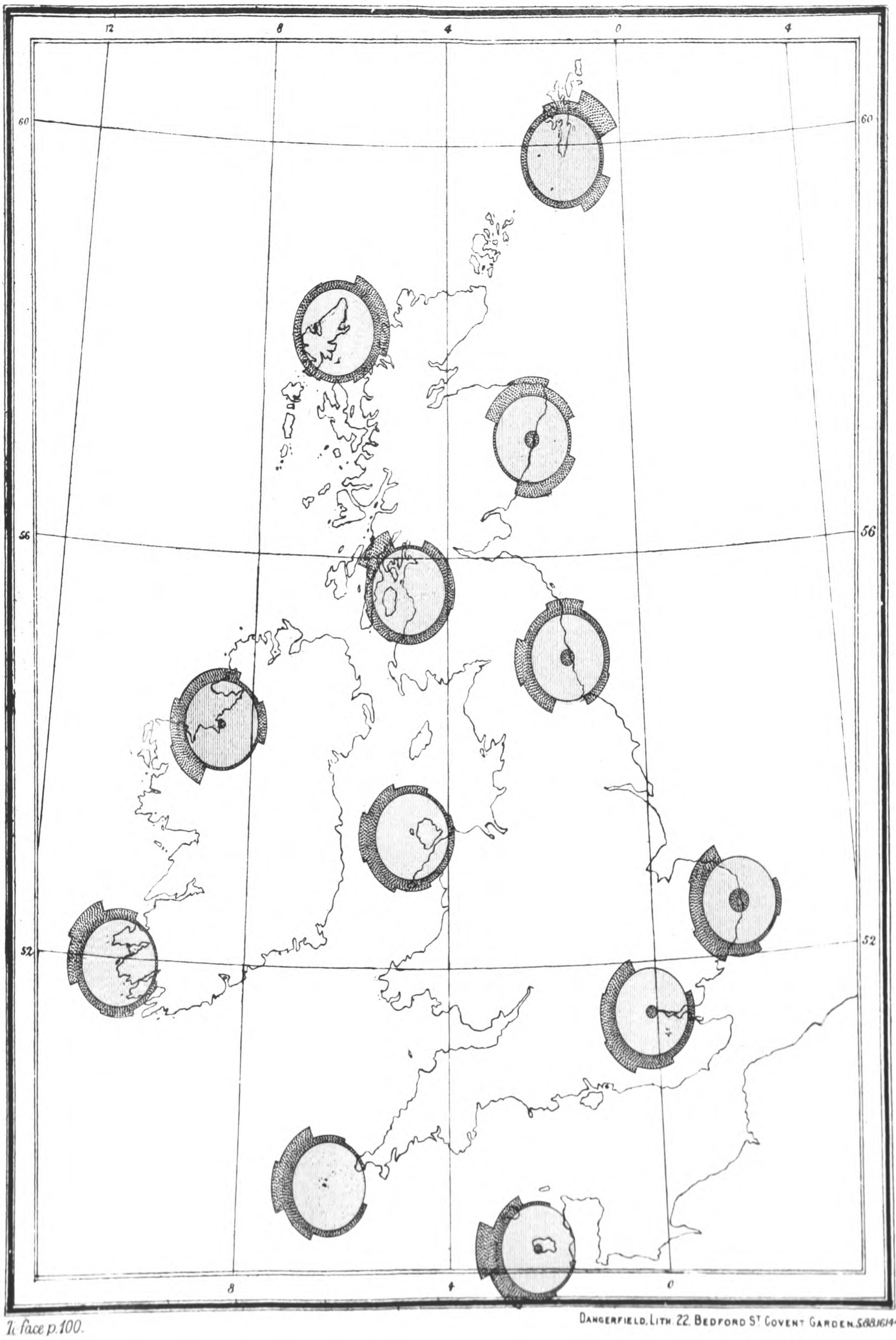
TENSION OF VAPOUR.			RELATIVE HUMIDITY.			AMOUNT OF CLOUD (0 to 10).			RAINFALL.			WEATHER, No. of Days of							WIND, No. of Observations of								
At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
in.	in.	in.	°/o	°/o	°/o				ins.	ins.																	
·331	·336	·334	81	87	84	8·4	8·0	8·2	3·170	·720	1st	19	0	0	0	2	22	1	6	7	8	9	8	3	9	6	6
·347	·341	·344	83	88	86	8·5	7·7	8·1	3·439	·920	31st	17	0	0	1	0	16	3	6	8	11	3	2	9	8	9	6
·371	·361	·366	81	89	85	8·7	7·7	8·2	3·740	·903	21st	21	0	0	2	0	20	2	11	2	1	2	3	13	8	4	18
·390	·365	·378	83	91	87	8·7	7·9	8·3	3·980	·935	21st	20	0	0	3	0	21	0	8	6	5	2	12	13	6	8	2
·395	·389	·392	80	87	84	8·3	7·2	7·8	3·360	·600	21st	18	0	0	1	0	16	0	7	5	3	4	6	9	16	10	2
·390	·370	·380	84	90	87	8·3	6·7	7·5	3·256	·900	21st	17	0	0	6	0	16	2	3	2	5	8	4	12	19	9	0
·422	·407	·415	84	94	89	8·3	7·7	8·0	5·534	1·200	21st	15	0	2	5	1	20	0	2	6	0	4	7	21	6	16	0
·427	·405	·416	86	92	89	—	—	—	3·760	·610	21st	20	0	0	0	—	—	4	2	0	0	4	12	17	13	5	9
·397	·393	·395	81	87	84	9·5	7·8	8·7	3·790	·680	19th	19	0	0	5	0	20	0	1	1	4	7	8	20	10	9	2
·402	·397	·400	85	88	87	8·6	7·3	8·0	3·170	·460	21st	16	0	0	1	0	14	1	3	2	7	5	7	10	22	6	0
·368	·350	·359	88	89	88	9·2	8·2	8·7	6·483	1·280	20th	22	0	1	1	0	21	0	3	2	8	5	0	9	9	25	1
·378	·373	·376	89	90	90	8·7	7·8	8·3	3·670	·700	19th	19	0	0	3	0	20	7	5	1	8	5	10	10	11	12	0
·395	·396	·396	79	84	82	9·5	7·8	8·7	3·720	·750	13th	23	0	1	3	0	21	1	3	6	1	3	6	28	9	3	3
·415	·395	·405	88	93	91	9·5	7·7	8·6	3·381	·460	21st	19	0	1	3	0	20	2	3	4	2	2	10	9	18	10	4
·398	·386	·392	85	88	86	9·2	8·1	8·7	3·190	·430	20th	20	0	0	3	0	22	3	2	4	5	2	10	17	13	7	2
·382	·376	·379	83	87	85	7·5	7·2	7·4	3·259	1·179	13th	19	0	0	1	0	12	0	0	2	5	2	4	14	25	10	0
·405	·392	·399	81	85	83	8·7	8·4	8·6	3·610	1·100	13th	22	0	0	1	0	19	1	2	0	1	3	16	5	16	18	1
·395	·390	·393	83	89	86	9·2	7·6	8·4	4·163	·710	19th	21	0	0	1	0	22	0	4	0	4	1	2	21	17	0	13
·413	·399	·406	81	89	85	8·8	7·9	8·4	2·865	·532	19th	17	0	0	3	0	20	0	2	0	1	2	9	34	8	4	2
·413	·421	·417	82	91	86	8·1	6·8	7·5	3·200	·700	21st	17	0	0	0	1	13	2	0	4	3	1	4	26	10	1	13
·421	·407	·414	84	90	87	8·1	8·0	8·1	3·670	·530	12th	20	0	1	2	1	17	5	2	3	4	2	6	23	16	4	2
·421	·407	·414	85	88	87	9·1	8·0	8·6	4·132	·915	19th	21	0	0	0	0	21	2	0	3	0	4	3	32	8	12	0
·410	·402	·406	83	89	86	8·7	6·9	7·8	3·290	·650	19th	20	0	0	1	1	17	5	3	4	3	1	3	27	17	4	0
·373	·370	·372	88	91	89	8·5	8·4	8·5	8·670	1·860	2nd	18	0	0	0	0	22	3	0	3	1	7	7	8	8	7	21
·383	·380	·382	88	94	91	8·6	8·4	8·5	6·468	·944	20th	24	0	0	0	0	20	6	3	5	8	0	4	10	10	13	9
·406	·404	·405	87	91	89	8·3	8·0	8·2	3·330	·636	1st	19	0	0	1	0	18	1	5	0	7	1	8	4	28	9	0
·391	·390	·391	86	91	88	8·1	8·3	8·2	2·752	·554	19th	24	0	0	1	0	17	4	4	1	2	2	6	20	14	11	2
·394	·397	·396	83	91	87	8·8	8·3	8·6	3·920	·810	19th	25	0	0	0	0	22	0	2	1	1	1	4	10	16	9	18
·368	·365	·367	95	97	96	9·5	8·9	9·2	8·680	1·680	19th	26	0	0	0	0	24	2	4	2	2	4	3	10	15	19	3
·413	·382	·398	85	89	87	8·4	6·8	7·6	3·550	·860	16th	20	0	0	0	0	16	1	2	3	1	2	6	19	21	7	1
·366	·376	·371	82	89	85	9·3	9·3	9·3	5·530	1·000	1st	28	0	0	0	0	26	0	4	5	3	1	3	15	15	11	5
·375	·387	·381	89	92	91	9·4	9·7	9·6	5·626	·940	1st	22	—	—	—	0	29	4	5	8	1	5	1	10	10	12	10
·372	·368	·370	85	90	87	9·4	8·9	9·2	4·097	·789	1st	23	0	0	4	0	25	0	10	1	0	2	7	10	8	12	12
·371	·386	·379	79	86	82	8·1	7·8	8·0	4·187	·531	1st	24	0	2	1	0	17	3	6	2	4	3	4	7	21	12	3
·372	·381	·377	82	89	86	9·3	9·3	9·3	3·003	·502	23rd	26	0	0	0	0	28	0	6	1	0	5	4	17	7	12	10
·424	·405	·415	85	89	87	8·7	6·9	7·8	1·570	·283	1st	18	0	0	0	1	16	4	3	2	2	2	4	18	26	3	2

TABLE C., JULY.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at TELEGRAPHIC REPORTING STATIONS in the BRITISH ISLANDS during the Month of JULY 1879. Observations are made at 8 a.m. daily.

(The Stations are grouped in Districts, and then arranged in order of Latitude, beginning in each case with the Station lying furthest North.)

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 8 a.m.	AIR TEMPERATURE.								TENSION OF VAPOUR.	RELATIVE HUMIDITY.	AMOUNT OF CLOUD.	RAINFALL.			WEATHER, No. of Days of							WIND, No. of Observations of								
			Means of				Absolute Extremes.																									
			At 8 a.m.	Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.				Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
		ins.	°	°	°	°	°		°		in.	%		ins.	ins.																	
0. SCOTLAND, N.	Sumburgh Head	29·680	52·3	46·7	56·0	51·4	42	18th	62	29th	0·339	86	8·2	2·18	0·53	19th	18	0	0	0	2	17	1	5	11	1	6	2	2	2	2	0
	Wick	29·667	53·4	48·3	59·8	54·1	45	6th	69	28th	·352	86	8·1	3·19	0·58	20th	22	0	0	0	3	21	1	4	3	2	9	4	1	4	4	0
	Stornoway	29·647	53·1	49·2	56·4	52·8	46	15th	60	20th, 28th	·354	87	7·5	2·67	0·48	29th	17	0	0	0	3	13	2	2	7	7	4	2	3	3	3	0
1. SCOTLAND, E.	Nairn	29·678	54·0	50·0	60·1	55·1	43	16th	70	25th	·334	80	7·1	3·83	0·56	31st	17	0	0	1	5	16	0	0	1	2	3	1	1	6	3	14
	Aberdeen	29·674	54·7	49·2	60·8	55·0	40	12th	71	28th	·342	81	7·6	3·80	0·79	20th, 31st	22	0	0	0	3	14	1	7	4	1	3	6	1	1	6	2
	Leith	29·682	55·3	50·5	62·4	56·5	42	12th	73	30th	·364	83	7·0	5·07	1·10	13th	18	0	0	0	0	10	1	2	2	7	2	0	6	8	3	1
2. ENGLAND, N.E.	Shields	29·699	54·7	51·0	60·1	55·6	47	11th	74	29th	·363	85	8·1	3·95	0·92	21st	23	0	0	1	2	21	5	6	2	2	3	0	5	7	4	2
	York	29·729	55·9	50·7	63·5	57·1	45	12th, 16th	75	28th, 29th	·380	85	8·2	3·83	0·78	20th	18	0	0	3	3	19	0	4	3	2	2	6	3	8	3	0
3. ENGLAND, E.	Yarmouth	29·762	57·3	52·3	62·0	57·2	47	6th	72	28th	·396	84	5·9	4·98	1·41	20th	19	0	0	3	5	7	1	0	0	2	1	4	7	6	7	4
	Cambridge	29·780	57·5	50·6	66·2	58·4	45	12th, 28th	80	30th	·407	86	8·4	3·60	0·49	21st	22	0	1	5	3	22	0	4	1	2	0	4	13	5	2	0
4. MIDLAND COUNTIES.	Nottingham	29·756	59·4	51·2	68·6	59·9	46	6th, 11th, 26th.	82	29th, 30th	·405	81	8·5	3·28	0·44	13th	19	0	0	4	3	22	1	2	3	0	3	8	3	4	6	2
	Oxford	29·790	56·0	52·4	64·1	58·3	48	6th, 11th	75	29th	·402	89	9·6	3·36	0·74	31st	19	0	0	0	1	29	0	2	0	1	1	5	5	15	1	1
5. ENGLAND, S.	London	29·801	58·4	52·5	66·6	59·6	47	27th	80	29th, 30th	·399	81	8·1	4·08	0·76	3rd	20	0	0	3	2	18	3	0	0	2	2	5	8	7	6	1
	Dover	29·813	58·5	54·5	62·4	58·5	49	11th	70	30th	·411	84	5·0	3·20	0·63	20th	20	0	0	1	7	5	2	1	2	2	1	0	9	12	3	1
	Hurst Castle	29·825	57·4	54·4	62·0	58·2	51	2nd	72	29th	·429	91	7·3	3·16	0·94	19th	21	0	0	3	2	10	3	3	0	1	1	4	5	12	5	0
6. SCOTLAND, W.	Ardrossan	29·685	54·0	51·4	59·5	55·5	48	13th, 31st	66	18th	·352	84	8·5	4·37	0·58	31st	25	0	0	0	2	21	1	1	4	4	3	3	4	3	9	0
7. ENGLAND, N.W.	Liverpool	29·735	55·6	52·7	61·6	57·2	49	2nd, 3rd	73	28th, 29th	·399	90	8·5	2·87	0·38	19th	22	0	0	0	1	20	4	1	1	4	4	1	4	12	3	1
	Holyhead	29·751	55·2	52·7	60·5	56·6	49	6th	68	20th	·387	89	7·7	4·32	0·77	31st	25	0	0	0	2	12	2	3	1	2	2	4	6	8	5	0
8. ENGLAND, S.W.	Pembroke	29·795	54·9	52·9	58·5	55·7	50	3rd, 6th	65	18th	·384	90	7·7	2·02	0·34	19th	19	0	0	0	3	18	6	1	0	2	2	2	4	9	9	2
	Prawle Point	29·873	55·3	51·3	60·1	55·7	48	5th	69	29th	·417	95	8·4	2·82	0·48	19th	19	0	0	0	1	19	3	0	2	0	0	5	7	12	3	2
9. IRELAND, N.	Donaghadee	29·731	54·3	50·6	59·4	55·0	48	3rd, 7th, 13th, 27th.	66	28th	·390	92	7·1	5·87	1·52	20th	25	0	0	0	3	14	2	6	2	1	3	3	6	6	4	0
	Mullaghmore	29·739	54·5	51·5	59·3	55·4	47	15th	65	29th	·381	90	8·7	5·65	1·26	1st	25	0	0	0	2	18	5	4	1	3	1	1	9	7	4	1
10. IRELAND, S.	Kingstown	29·763	55·6	51·8	62·2	57·0	49	2nd, 3rd, 5th, 11th, 16th.	74	28th	·369	83	7·4	3·35	0·48	12th	24	0	0	1	2	14	7	2	2	1	5	3	2	8	8	0
	Valencia	29·844	55·5	51·0	61·2	56·1	46	28th	64	16th, 17th, 26th.	·383	87	9·4	4·07	0·64	23rd	24	0	0	0	0	25	2	4	1	1	2	4	3	7	9	0
	Roche's Point	29·830	56·1	51·7	62·4	57·1	46	11th	69	15th, 18th	·369	81	6·9	4·96	0·76	23rd	23	0	0	1	2	8	5	7	1	1	1	2	4	8	7	0
CHANNEL ISLANDS	Scilly	29·885	56·6	54·1	60·1	57·1	49	1st	66	28th	·411	89	9·2	2·18	0·37	2nd	19	0	0	0	0	24	6	2	1	0	2	2	5	11	8	0
	Jersey	29·885	57·2	53·5	61·8	57·7	49	2nd	78	29th	·423	90	8·4	1·87	0·51	1st	20	0	0	0	1	19	6	1	0	0	1	2	7	14	5	1

MONTHLY WIND CHART FOR JULY, 1879.


12
8
4
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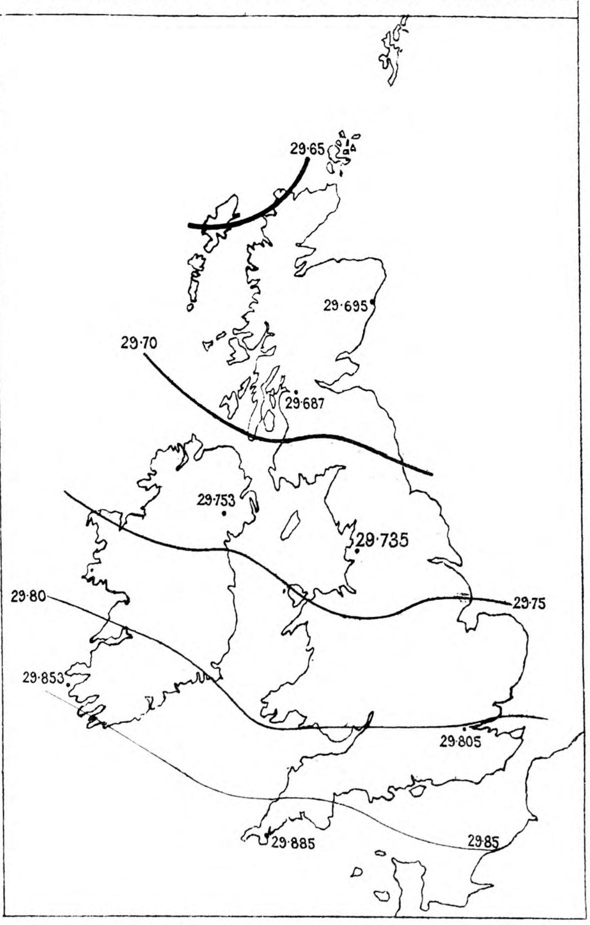
4
60
60
56
56
52
52
8
4
0

To face p. 100.

DANGERFIELD, LITH. 22, BEDFORD ST. COVENT GARDEN. 5881/6144.

MONTHLY WEATHER CHART JULY, 1879.

1. DISTRIBUTION OF MEAN PRESSURE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29·70
29·687
29·753
29·735
29·80
29·75
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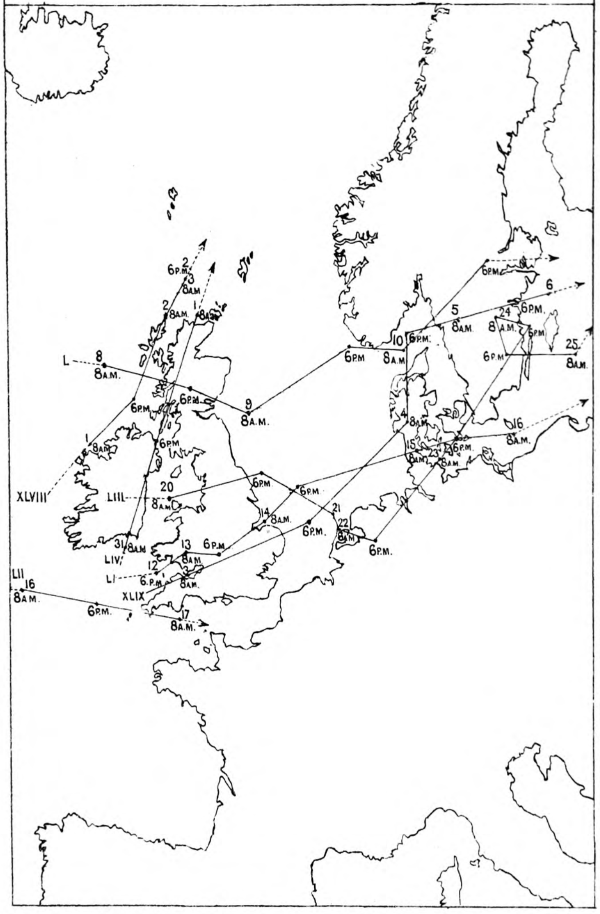
29·805
29·885
29·85

2. MOVEMENTS OF DEPRESSIONS.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6P.M.
3
8A.M.
2
8A.M.
1
8A.M.
L
8
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6P.M.
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9
8A.M.
10
6P.M.
6P.M.
8A.M.
6P.M.
5
8A.M.
6
24
6P.M.
8 A.M.
6P.M.
25
8A.M.
1
8A.M.
XLVIII
6P.M.
4
8A.M.
15
8A.M.
6P.M.
16
8A.M.
LIII
20
8A.M.
6P.M.
6P.M.
21
14
8A.M.
6P.M.
22
6P.M.
31
8A.M.
13
6P.M.
LIV
12
8A.M.
LI
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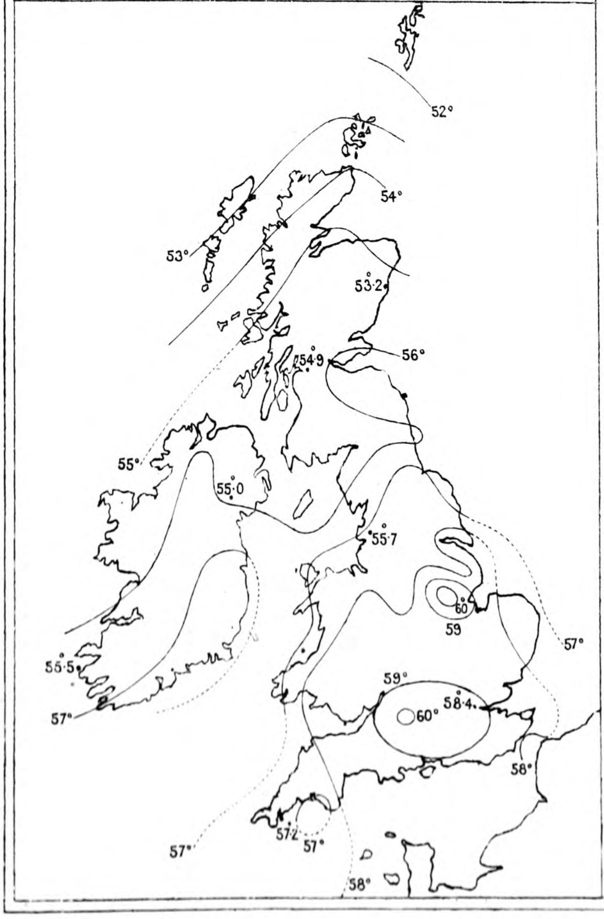
17
8A.M.

3. DISTRIBUTION OF MEAN TEMPERATURE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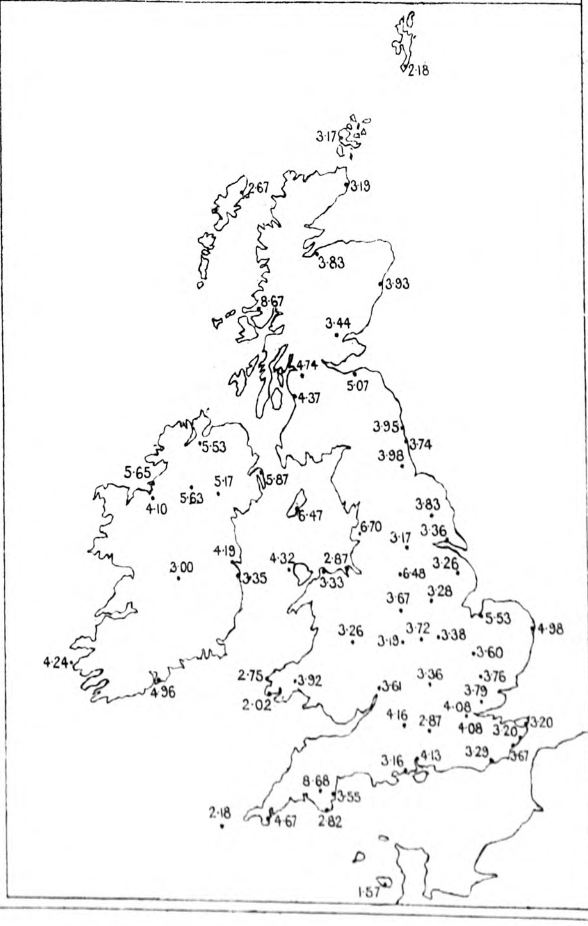
54°
53°
53·2
54·9
56°
55°
55·0
55·7
60
59
57°
55·5
57°
59°
58·4
60°
58°
57·2
57°
57°
58°

4 RAINFALL


2·18
3·17
3·19
2·67
3·83
3·93
8·67
3·44
4·74
5·07
4·37
3·95
3·74
3·98
5·53
5·65
5·17
5·87
4·10
5·63
3·83
3·36
6·47
6·70
3·17
4·19
4·32
2·87
3·00
3·35
3·33
6·48
3·26
3·28
3·67
5·53
4·98
3·26
3·19
3·72
3·38
4·24
3·60
2·75
3·92
3·61
3·36
3·76
4·96
2·02
3·79
4·16
2·87
4·08
4·08
3·20
3·20
3·16
4·13
3·29
3·67
8·68
3·55
2·18
4·67
2·82
1·57

To follow Wind Chart for July.

Dangerfield Lith 22, Bedford S^t Covent Garden 3.88.16144.

REMARKS FOR AUGUST 1879.

(*Tables A. to C., August, with Monthly Wind and Weather Charts.*)

Wind.—Westerly winds, veering at the south-western stations to North-west and North, blew during the 1st; but on the following morning an Easterly current, which rose occasionally to the force of a gale, set in on the Channel coasts, and in a few hours became general over the United Kingdom. After a short time, however, this was succeeded by a moderate Westerly wind, which lasted till the 5th, when it backed to the Southward. A well-marked cyclonic circulation then followed, as depression No. LV. crossed the country, the wind veering to West over England, and to North-west and North in the west, while Easterly winds, which subsequently *backed* to North-east and North, were experienced at the northern stations. The Northerly current continued till the 9th, when a Southerly wind appeared in the south-west and subsequently spread over the rest of the British Isles, continuing to blow with only slight variations till the 14th, when it was followed by a short spell of variable airs. South again became the predominant direction on the 15th, and next day another complete cyclonic circulation was exhibited, a strong Northerly wind blowing on our western coasts, Westerly in the Channel, and a moderate Easterly wind in the north. The Westerly wind spread northwards for a short time, after which the direction again became generally Southerly, and the force, as a rule, light. For some days the force varied considerably, ranging from a light breeze to a moderate gale, but the direction changed but little; on the 23rd, however, it became variable for a few hours and then Westerly, and from that time till the 30th the direction was governed by a series of depressions which skirted our western and northern coasts, and caused a continuance of South-westerly or Westerly winds, which varied in strength from a moderate breeze to a gale. At the close of the month a further veering took place, and North-westerly winds were felt over the greater part of the United Kingdom.

For the whole month therefore the predominant winds over England and Ireland were from between South and West or North-west, Easterly winds being comparatively rare,—a condition which was considerably modified in Scotland, where the percentage of winds from Easterly points was generally large.

Pressure.—An abnormally low mean barometer was again experienced, the defect being much the same in amount as in July, and ranging from about ·2 inch at our northern stations to upwards of ·1 inch at the southern; the Monthly Chart indicating gradients for Westerly winds. Higher readings were registered than in July, and at the north-western stations the range of the barometer was considerably larger, amounting to 1·4 inch at Armagh and Glasgow, but to less than ·9 inch over the south of England. In nearly every case the extreme limits attained by the mercury were reached within a few days of each other, the minima about the 28th, and the maxima at the close of the 31st.

Movements of the Depressions.—Depressions were again very frequent during the month. In most instances they followed a northerly or north-easterly track over or past our north-western coast, but in one case (No. LV.) the centre passed up St. George's Channel and across the north of England; while in another (No. LVI.), after crossing Ireland to England it turned to the north-west and regained the Atlantic near the Hebrides. Most of the depressions were rather shallow, but to this rule No. LX. was a notable exception. There was no well-marked anticyclonic system observed over the British Isles.

Temperature.—The mean temperature varied from about 61° in the south-east of England to 54° in the north of Scotland, and was therefore again generally low, although the deficiency was not so great as in July. The range of temperature amounted to about 30° at most stations, but at Nottingham it was 39°, while at a few coast stations it did not exceed 20°. The maxima were most generally recorded about the 12th, at which time Southerly or South-easterly winds were experienced; at Nottingham only was so high a temperature as 80° reached, as a rule the highest readings only slightly exceeded 75°, and at some stations they did not reach 70°. The minima ranged between 40° and 50°, and were registered as a rule either about the 10th or at the close of the month.

Vapour Tension was highest over the south of England, and lowest over Ireland and the north of Scotland, the mean values ranging from about ·45 inch to ·36 inch respectively. *Relative Humidity* was highest in the extreme north of Scotland, and in the south-west of England.

Rainfall.—This was another very wet month, and over nearly the whole of the United Kingdom the fall of rain was largely in excess of the average. The fall along the north-east coasts was not greatly different from the normal, but in many districts it was more than double the average amount. At Buxton it was 8·2 inches, at Carmarthen 9·2 inches, Strathfield Turgiss 7·1 inches (more than *three* times the average), &c. Heavy daily falls were recorded on various dates, and amongst the heaviest were 3·18 inches at Cambridge, 2·43 inches at Yarmouth, and 2·285 inches at Saint David's, on the 2nd; and also those which accompanied the advance of depression No. LVI., about the 16th, when 2·3 inches fell at Cheltenham; but falls of over an inch in twenty-four hours were recorded at many stations.

TABLE A., AUGUST.—SHOWING the MEAN and EXTREME PRESSURES and TEMPERATURES recorded at each of the SEVEN SELF-RECORDING OBSERVATORIES of the METEOROLOGICAL OFFICE during the Month of AUGUST 1879, together with the MONTHLY VAPOUR TENSION, the RELATIVE HUMIDITY, and TOTAL RAINFALL.

NAMES OF OBSERVATORIES.	PRESSURE at 32° F. and the Mean Sea Level (In English Inches).						TEMPERATURE In the Shade (In Degrees Fahrenheit).						HYGROMETRIC VALUES.		RAINFALL (In English Inches).
	Mean for the Month.	Extremes.				Range.	Mean for the Month.	Extremes.				Range.	Tension of Vapour (In English Inches).	Relative Humidity (Saturation = 100).	
		Minimum.		Maximum.				Minimum.		Maximum.					
		Reading.	Date.	Reading.	Date.			Reading.	Date.	Reading.	Date.				
	ins.	ins.	D. H.	ins.	D. H.	ins.	°	°	D. H.	°	D. H.	°	in.	%	ins.
Valencia - -	29·777	29·195	28th, 1 p.m. 2 p.m.	30·357	31st, Midt.	1·162	57·0	47·9	2nd, 5 a.m.	67·4	8th, 4 p.m.	19·5	·391	84	5·418
Armagh - -	·738	28·902	28th, 7 p.m.	·303	31st, Midt.	1·401	55·8	44·2	31st, 6 a.m.	72·3	11th, 2 p.m.	28·1	·375	84	3·100
Glasgow - -	·689	·779	28th, 10 p.m.	·210	31st, Midt.	1·431	55·7	42·4	10th, 4 a.m.	71·2	12th, 2 p.m.	28·8	·363	82	5·264
Aberdeen -	·698	28·850	29th, 1 a.m.	·172	3rd, 1 a.m.	1·322	54·3	42·9	27th, 4 a.m.	68·0	14th, 3 p.m.	25·1	·357	85	3·934
Falmouth -	·862	29·487	27th, 3 p.m.	·375	31st, Midt.	0·888	58·5	48·9	31st, Midt.	67·9	13th, 1 p.m.	19·0	·420	86	7·355
Stonyhurst -	·756	·191	28th, 9 p.m.	·295	31st, Midt.	1·104	56·7	44·8	8th, 11 p.m. 10th, 5 a.m.	74·2	12th, 3 p.m.	29·4	·376	82	7·627
Kew - -	29·843	29·465	27th, 6 p.m.	30·334	31st, Midt.	0·869	60·1	45·3	31st, Midt.	74·7	15th, 4 p.m.	29·4	·425	83	4·930

TABLE B., AUGUST.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at
The values are not
(The Stations are grouped in Districts, and then arranged in order of Latitude,

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 9 a.m. and 9 p.m.	AIR TEMPERATURE.									
			At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Means of			Absolute Extremes.			
						Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.
		ins.	°	°	°	°	°	°	°		°	
0. SCOTLAND, N.	Orkneys (Sandwick Manse)	29·679	54·9	52·3	53·6	50·1	58·4	54·3	42·7	1st	65·8	12th
1. SCOTLAND, E.	Glenalmond	—	—	—	—	47·9	61·1	54·5	39·0	30th	74·0	12th
2. ENGLAND, N.E.	Seaham	29·736	58·2	53·9	56·1	50·2	63·6	56·9	42·8	30th	71·0	23rd
	Durham*	29·727	60·0	53·0	56·5	49·7	65·2	57·5	42·6	10th	76·2	12th
	Hull	29·784	60·0	56·5	58·3	52·2	66·5	59·4	45·0	9th	73·5	11th
	Kelstern 𝕸	29·798	58·5	54·3	56·4	49·7	65·0	57·4	41·7	2nd	71·5	11th
3. ENGLAND, E.	Hillington 𝕸	29·814	61·1	56·2	58·7	51·5	68·8	60·2	44·2	10th	76·8	18th
	Audley End (Saffron Walden) 𝕸	29·818	61·0	57·3	59·2	52·4	67·5	60·0	42·3	10th	76·3	13th
	Chigwell Row	29·860	60·0	59·2	59·6	53·4	65·6	59·5	47·0	10th	75·0	13th
4. MIDLAND COUNTIES.	Wakefield 𝕸	29·764	58·7	56·9	57·8	52·1	65·5	58·8	44·1	9th	73·3	12th
	Buxton 𝕸	29·804	55·5	53·3	54·4	48·7	61·9	55·3	40·0	2nd	71·9	12th
	Cheadle 𝕸	29·813	55·6	54·6	55·1	49·9	63·1	56·5	41·9	10th	74·1	12th
	Leicester	29·798	60·3	58·2	59·3	51·9	66·1	59·0	43·5	8th	75·2	12th
	Uppingham	29·805	59·3	55·4	57·4	50·8	66·6	58·7	43·8	10th	77·2	12th
	Oscott	29·796	58·4	55·8	57·1	51·0	65·8	58·4	44·2	30th	75·8	12th
	Churchstoke 𝕸	29·816	56·7	55·1	55·9	49·6	63·8	56·7	40·2	10th	73·0	12th
	Cheltenham 𝕸	29·815	60·2	57·0	58·6	51·9	66·7	59·3	41·4	24th	77·1	12th
5. ENGLAND, S.	Marlborough 𝕸	29·855	59·9	56·3	58·1	52·3	66·7	59·5	44·1	10th	77·5	12th
	Strathfield Turgiss 𝕸	29·828	61·3	56·8	59·1	52·4	67·9	60·2	44·2	10th	77·3	12th
	Ramsgate 𝕸	29·902	61·6	58·9	60·3	55·5	67·0	61·3	47·2	10th	78·2	14th
	Folkestone	29·880	60·7	58·1	59·4	54·9	65·8	60·4	49·3	10th	76·9	13th
	Southampton	29·859	61·4	58·2	59·8	54·4	66·6	60·5	47·0	30th	77·0	12th
	Hastings	29·882	60·7	58·5	59·6	55·6	65·2	60·4	50·4	30th	74·3	13th
6. SCOTLAND, W.	Laudale	29·693	56·8	55·6	56·2	50·8	63·0	56·9	42·8	3rd	71·0	12th
7. ENGLAND, N.W.	Douglas (Isle of Man)	29·736	57·0	54·2	55·6	50·3	61·1	55·7	41·1	15th, 30th	67·0	11th
	Llandudno 𝕸	29·766	58·7	57·3	58·0	53·0	63·7	58·4	47·3	10th	75·2	12th
8. ENGLAND, S.W.	St. David's	29·804	58·5	56·2	57·4	53·1	62·8	58·0	48·6	2nd	72·4	12th
	Caermarthen 𝕸	29·809	59·5	56·2	57·9	52·3	66·2	59·3	42·9	30th	76·7	12th
	Dartmoor 𝕸	29·860	54·6	52·3	53·5	50·2	58·5	54·4	40·5	31st	63·9	15th
	Babbacombe 𝕸	29·864	60·1	56·2	58·2	53·9	64·5	59·2	45·8	30th	71·1	13th
9. IRELAND, N.	Londonderry	29·725	57·4	55·0	56·2	51·1	61·9	56·5	44·5	30th	73·0	11th
	Brookeborough	29·704	55·6	54·3	55·0	49·3	62·9	56·1	40·4	2nd	75·9	11th
	Markree Castle	29·730	56·7	53·2	55·0	48·3	62·9	55·6	39·6	8th	74·0	11th
10. IRELAND, S.	Dublin	29·770	57·7	56·1	56·9	51·7	63·7	57·7	44·4	31st	71·7	11th
	Parsonstown	29·771	58·0	54·1	56·1	49·2	64·6	56·9	40·3	2nd	73·5	11th
CHANNEL	Jersey (St. Aubin's)	29·940	61·2	59·6	60·4	56·4	66·5	61·5	51·4	1st	79·3	12th

NOTE.—The stations marked thus 𝕸 are in connection with the Royal Meteorological Society.

* At Durham the observations were taken at 10 a.m. and 10 p.m. each day.

STATIONS of the SECOND ORDER in the BRITISH ISLANDS, during the Month of AUGUST 1879.
corrected for Diurnal Range.
beginning in each case with the Station lying furthest North.)

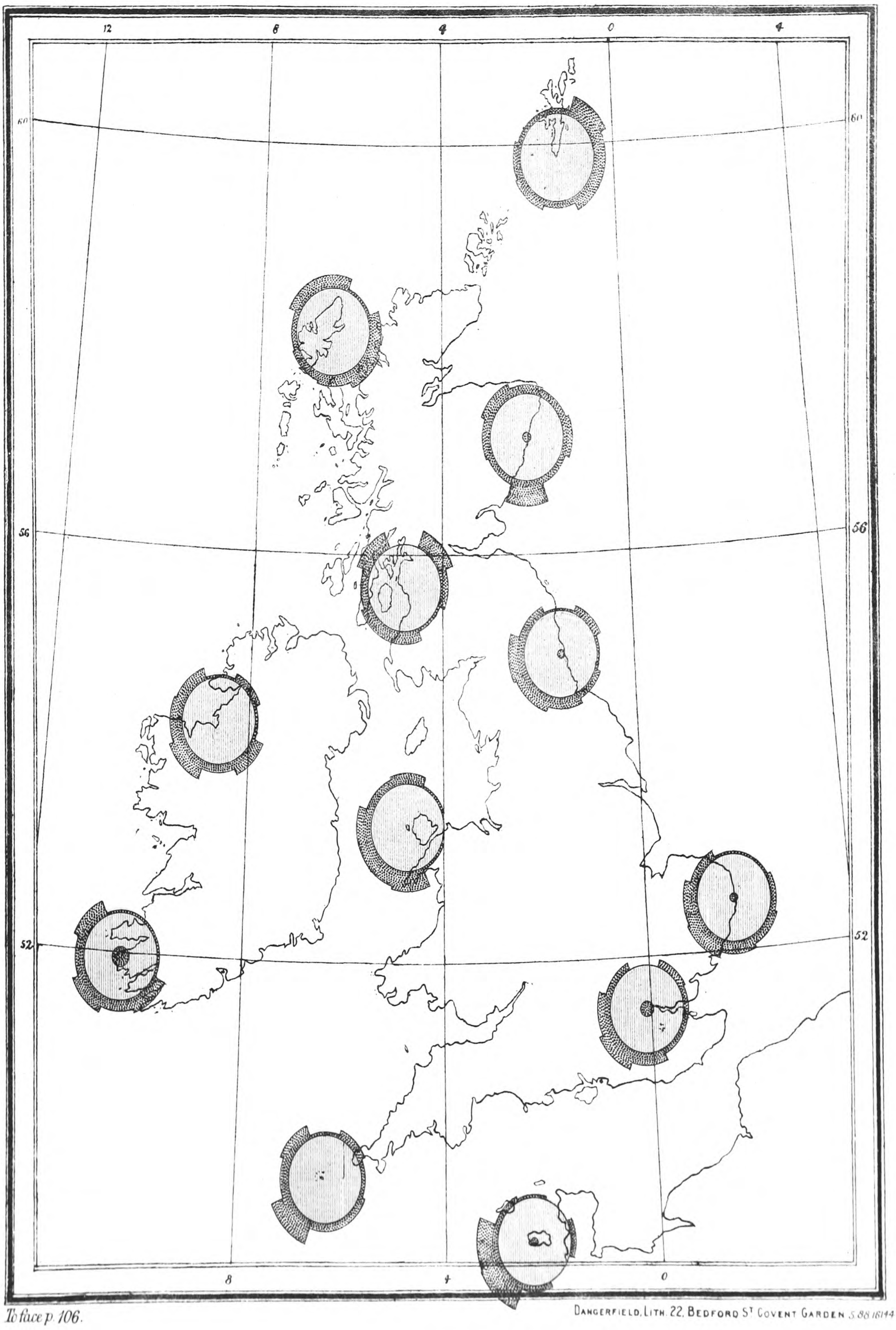
Tension of Vapour.			Relative Humidity.			Amount of Cloud (0 to 10).			Rainfall.			Weather. No. of Days of							Wind. No. of Observations of								
At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
in.	in.	in.	%	%	%				ins.	ins.																	
·375	·354	·365	87	90	89	6·9	7·7	7·3	3·390	·650	5th	22	0	0	1	2	15	2	4	4	8	16	2	8	8	6	6
—	—	—	—	—	—	—	—	—	5·075	·925	5th	21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
·393	·361	·377	81	87	84	6·4	4·8	5·6	2·716	·750	16th	20	0	0	4	0	7	0	2	2	1	4	8	12	10	3	20
·406	·372	·389	79	92	85	7·5	5·4	6·5	3·512	·690	6th	18	0	0	4	1	9	0	1	8	2	5	13	17	10	3	3
·420	·401	·411	81	88	85	7·1	5·5	6·3	2·540	·450	27th	16	0	0	1	4	10	0	1	0	3	2	15	16	18	4	3
·413	·388	·401	84	91	88	7·2	5·4	6·3	3·010	·732	27th	17	0	0	4	2	9	1	1	4	4	7	10	17	15	2	2
·451	·427	·439	84	94	89	6·9	6·3	6·6	3·410	·772	19th	14	0	1	6	2	10	1	0	2	4	10	6	21	12	7	0
·433	·425	·429	81	89	85	4·0	4·9	4·5	3·330	·620	19th	16	0	1	2	4	3	1	0	0	0	3	14	32	6	3	4
·420	·417	·419	81	83	82	7·0	5·6	6·3	4·660	·760	17th	15	0	0	2	1	7	0	2	1	7	6	11	19	10	5	1
·404	·388	·396	82	83	83	7·1	5·1	6·1	3·190	·590	30th	16	0	0	5	1	9	1	2	4	6	10	5	12	22	1	0
·365	·363	·364	83	89	86	7·5	6·7	7·1	8·220	1·150	16th	22	0	3	5	1	14	0	4	3	4	6	1	8	19	17	0
·389	·374	·382	88	88	88	7·7	6·4	7·1	7·260	1·640	17th	19	0	1	3	0	11	5	7	0	7	7	7	11	10	8	5
·408	·410	·409	79	84	82	7·7	6·9	7·3	4·010	1·180	2nd	19	0	0	4	1	14	0	4	3	4	1	7	25	7	3	8
·415	·396	·406	82	89	86	7·4	5·6	6·5	2·867	·818	2nd	15	0	0	2	2	11	0	1	1	3	5	18	15	4	9	6
·409	·394	·402	84	88	86	8·3	6·7	7·5	5·470	1·460	2nd	19	0	0	5	0	15	4	5	5	5	5	10	18	7	4	3
·380	·375	·378	83	86	84	7·2	7·1	7·2	4·886	1·390	16th	19	0	0	4	0	11	0	3	3	7	7	4	19	14	4	1
·433	·416	·425	83	89	86	7·4	6·4	6·9	6·560	2·321	16th	19	0	0	5	1	13	1	4	2	0	1	18	16	16	2	3
·421	·405	·413	82	89	86	7·6	6·1	6·9	6·615	1·460	19th	19	0	0	2	1	15	0	3	2	10	1	1	19	8	1	17
·444	·424	·434	82	91	87	5·6	6·0	5·8	7·090	1·698	2nd	17	0	1	4	1	7	0	0	2	0	6	6	32	8	8	0
·446	·456	·451	82	90	86	7·3	5·4	6·4	3·190	·580	19th	20	0	0	1	1	7	2	1	4	3	2	4	30	5	0	13
·455	·440	·448	86	90	88	7·0	6·7	6·9	3·082	·710	19th	22	0	0	1	2	13	4	2	3	2	4	8	29	11	2	1
·447	·434	·441	83	89	86	8·0	6·6	7·3	6·423	1·260	19th	19	0	1	3	3	17	0	1	3	3	3	6	33	9	3	1
·453	·434	·444	86	88	87	7·4	6·3	6·9	3·650	·690	19th	22	0	0	1	6	16	6	4	8	2	0	7	29	9	0	3
—	—	—	—	—	—	8·1	7·8	8·0	4·300	·780	28th	20	0	0	2	1	17	2	1	0	3	11	9	10	10	9	9
·401	·389	·395	86	92	89	7·3	7·2	7·3	6·524	1·880	5th	21	0	0	4	0	15	3	1	1	8	4	7	11	9	9	12
·400	·402	·401	81	85	83	6·6	5·3	6·0	6 845	1·910	16th	15	0	0	3	5	12	3	11	0	3	2	9	5	30	2	0
·411	·405	·408	84	89	86	5·8	5·6	5·7	7·166	2·285	2nd	19	0	1	3	3	7	4	2	2	4	8	6	20	12	4	4
·412	·403	·408	82	89	85	7·7	6·8	7·3	9·230	1·320	4th	23	0	1	5	0	14	2	5	0	7	7	8	13	11	5	6
·396	·386	·391	93	98	95	8·5	9·4	9·0	8·890	1·400	5th	23	1	0	2	0	24	3	2	4	6	3	4	15	20	7	1
·434	·410	·422	84	90	87	7·8	7·3	7·6	5·490	1·320	19th	23	0	1	2	1	18	2	1	5	5	1	6	21	15	6	2
·392	·388	·390	83	89	86	8·2	7·8	8·0	3·970	·460	3rd	27	0	0	4	0	16	0	3	4	3	5	5	15	9	8	10
·386	·374	·380	87	88	88	9·1	8·2	8·7	5·292	1·290	15th	21	—	—	—	2	23	4	4	3	10	2	1	9	6	14	13
·382	·361	·372	83	88	86	8·0	7·2	7·6	4·409	·977	15th	23	0	1	3	0	16	0	6	3	1	6	11	8	3	8	16
·385	·385	·385	81	86	83	5·8	6·0	5·9	3·704	1·615	5th	19	0	0	0	0	6	3	3	1	3	8	8	14	16	8	1
·379	·373	·376	79	89	84	6·7	6·4	6·6	4·538	·814	25th	23	0	0	0	2	11	2	1	2	0	9	11	14	7	6	12
·473	·461	·467	88	90	89	8·3	6·8	7·6	3·956	·650	8th	20	0	0	2	1	17	1	1	2	4	2	5	23	17	5	3

TABLE C., AUGUST.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at TELEGRAPHIC REPORTING STATIONS in the BRITISH ISLANDS, during the Month of AUGUST 1879. Observations are made at 8 a.m. daily.

(The Stations are grouped in Districts, and then arranged in order of Latitude, beginning in each case with the Station lying furthest North.)

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 8 a.m.	AIR TEMPERATURE.								TENSION OF VAPOUR.	RELATIVE HUMIDITY.	AMOUNT OF CLOUD.	RAINFALL.			WEATHER. No. of Days of							WIND. No. of Observations of								
				Means of			Absolute Extremes.																									
			At 8 a.m.	Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.				Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
		ins.	°	°	°	°	°		°		in.	%		ins.	ins.																	
0. SCOTLAND, N.	Sumburgh Head	29·667	53·5	49·4	57·8	53·6	45	4th	63	14th, 17th	0·387	94	7·9	4·20	0·55	21st	21	0	0	0	2	16	2	2	8	5	5	2	4	3	2	0
	Wick	29·664	54·2	48·5	59·9	54·2	40	3rd, 26th, 30th.	68	14th	·382	91	7·2	3·14	0·93	16th	24	0	0	0	4	16	3	3	2	5	5	6	2	4	4	0
	Stornoway	29·630	54·1	49·3	58·0	53·7	43	3rd	64	12th, 13th	·379	90	5·9	5·03	1·10	22nd	19	0	0	1	10	11	4	5	1	5	6	4	3	2	5	0
1. SCOTLAND, E.	Nairn	29·673	54·2	50·2	61·1	55·7	43	3rd	75	12th	·345	82	6·3	3·96	0·75	6th	23	0	0	0	9	14	0	0	0	1	1	0	3	5	3	18
	Aberdeen	29·681	55·9	49·7	62·8	56·3	42	30th	74	14th	·374	84	5·6	4·31	1·19	16th	25	0	1	3	12	13	1	3	2	3	2	10	2	3	5	1
	Leith	29·684	56·5	51·1	64·5	57·8	45	15th, 30th	78	12th	·384	84	5·4	2·07	0·40	5th	21	0	0	2	8	8	0	0	2	9	2	1	5	9	3	0
2. ENGLAND, N.E.	Shields	29·719	56·1	51·6	62·5	57·1	45	30th	70	23rd	·380	84	6·5	3·23	0·83	16th	21	0	1	3	9	16	4	1	3	1	2	4	7	8	4	1
	York	29·759	56·0	50·6	66·3	58·5	42	10th	75	11th, 12th, 14th.	·399	89	6·2	2·45	0·39	27th	20	0	0	5	11	15	0	1	0	2	1	12	4	5	6	0
3. ENGLAND, E.	Yarmouth	29·827	59·0	54·0	65·0	59·5	49	10th, 30th	71	1st	·424	85	4·5	5·03	2·43	2nd	20	0	1	2	12	4	0	1	1	2	3	5	8	7	3	1
	Cambridge	29·815	58·8	52·0	69·3	60·7	45	30th	77	14th	·430	87	6·4	6·07	3·18	2nd	17	0	0	5	8	13	0	3	0	1	4	6	12	0	4	1
4. MIDLAND COUNTIES.	Nottingham	29·791	60·4	50·7	69·9	60·3	42	10th	81	11th, 12th	·424	81	6·4	4·31	0·79	2nd	19	0	0	4	8	13	0	2	3	2	3	7	8	3	2	1
	Oxford	29·809	58·2	53·7	65·6	59·7	48	10th, 24th, 30th, 31st.	76	12th	·430	88	7·9	5·04	1·13	19th	18	0	0	2	4	20	0	0	1	2	2	6	5	9	1	5
5. ENGLAND, S.	London	29·835	59·8	53·8	68·7	61·3	46	10th	79	13th	·420	82	6·6	5·14	1·08	23rd	20	0	0	0	6	14	2	0	3	2	2	5	8	6	3	2
	Dover	29·865	60·4	57·1	64·6	60·9	53	10th, 30th, 31st.	72	21st	·447	86	4·5	3·36	0·54	19th	18	0	1	3	10	4	3	2	3	1	1	1	13	10	0	0
	Hurst Castle	29·837	59·3	56·6	63·9	60·3	53	2nd, 10th, 24th.	71	12th	·466	93	6·0	5·12	1·21	19th	20	0	0	2	7	11	6	1	4	3	1	3	7	10	2	0
6. SCOTLAND, W.	Ardrossan	29·679	55·3	52·2	61·3	56·8	42	10th	71	12th	·372	85	6·5	5·02	1·25	5th	18	0	0	2	6	11	3	0	7	3	1	5	5	3	7	0
7. ENGLAND, N.W.	Liverpool	29·750	56·2	53·3	63·1	58·2	48	30th, 31st	76	12th	·388	86	6·5	6·21	1·39	17th	20	0	0	0	6	13	1	0	0	1	9	4	4	10	3	0
	Holyhead	29·752	56·6	53·5	62·9	58·2	49	10th, 30th	74	12th	·405	88	6·2	6·22	1·42	17th	20	0	0	1	8	10	3	4	1	0	1	8	7	7	3	0
8. ENGLAND, S.W.	Pembroke	29·788	57·2	54·6	61·2	57·9	51	9th, 10th	70	12th	·414	88	5·7	5·92	1·28	4th	20	0	0	1	6	9	6	1	2	2	3	3	7	6	4	3
	Prawle Point	29·872	57·5	54·0	61·5	57·8	49	30th	69	11th	·440	93	7·3	4·55	0·79	19th	23	0	0	1	4	14	2	1	2	2	0	3	9	9	1	4
9. IRELAND, N.	Donaghadee	29·724	54·7	50·4	60·6	55·5	43	31st	68	27th	·399	93	5·4	4·08	0·69	5th	22	0	1	3	9	7	1	3	1	0	5	3	6	8	5	0
	Mullaghmore	29·695	55·7	52·3	61·6	57·0	46	31st	72	11th	·381	86	7·5	4·01	0·70	25th	23	0	1	2	4	13	5	1	2	1	5	3	8	6	5	0
10. IRELAND, S.	Kingstown	29·756	56·6	52·0	64·8	58·4	46	31st	71	12th	·365	79	4·9	3·06	0·96	5th	21	0	0	0	9	4	3	0	0	2	5	4	2	11	7	0
	Valencia	29·763	57·4	51·9	62·6	57·3	46	2nd	67	2nd	·400	85	7·9	5·12	1·54	26th	24	0	0	0	0	15	4	1	1	1	6	4	6	3	6	3
	Roche's Point	29·783	57·0	52·8	65·2	59·0	47	31st	73	14th	·397	85	5·9	4·85	0·98	26th	25	0	0	2	7	10	2	4	1	1	3	3	8	6	5	0
CHANNEL ISLANDS	Scilly	29·847	58·9	55·9	62·6	59·3	53	30th	67	12th	·460	93	8·5	4·94	1·14	4th	27	0	0	1	0	18	6	1	3	2	3	3	10	4	5	0
	Jersey	29·885	59·9	56·6	65·1	60·9	52	31st	79	12th	·467	91	7·9	4·07	0·70	27th	20	0	0	1	1	18	8	1	0	2	0	2	12	11	2	1

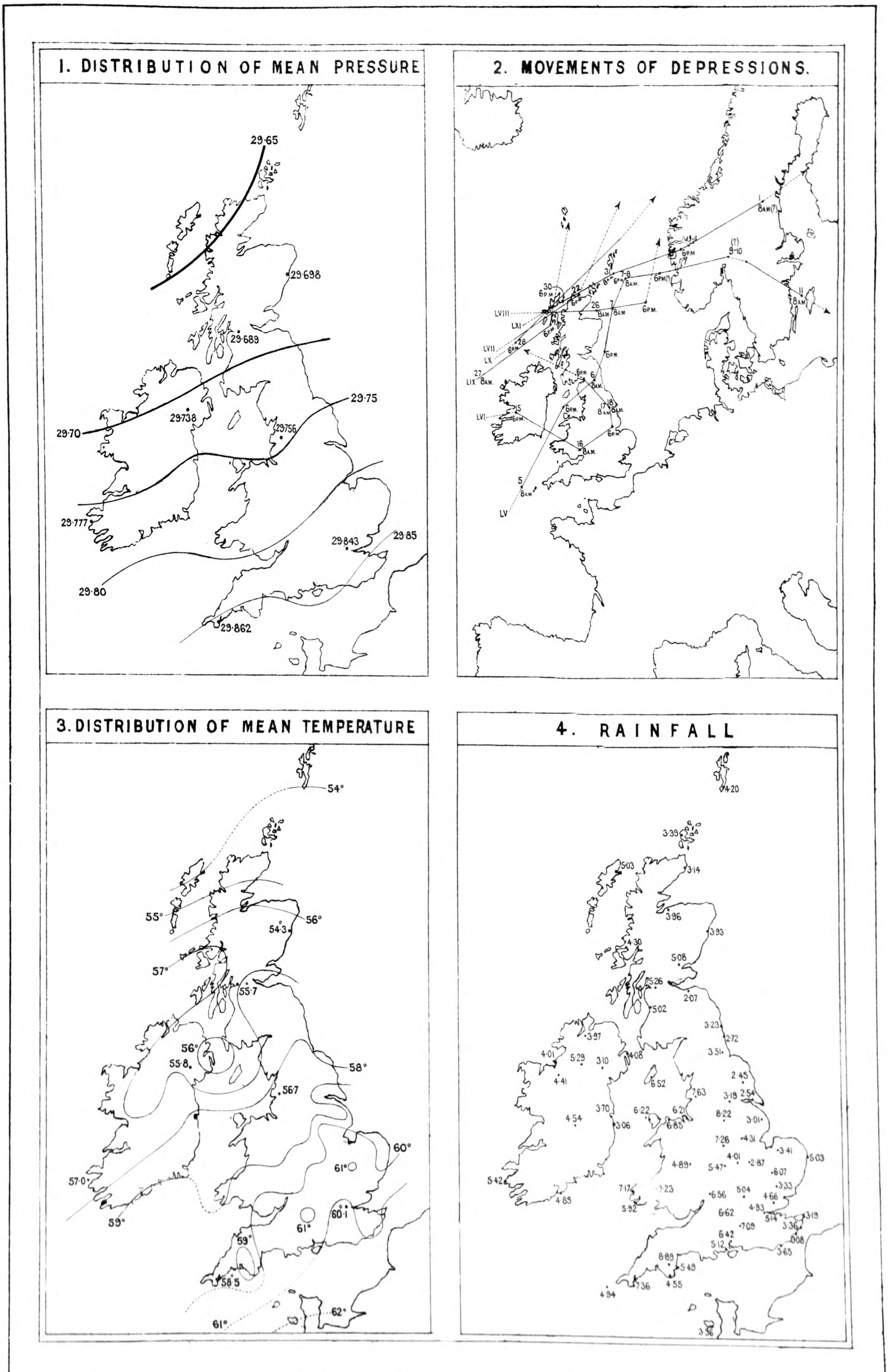
MONTHLY WIND CHART FOR AUGUST, 1879.


12
8
4
0
4
60
60
56
56
52
52
8
4
0

To face p. 106.

DANGERFIELD, LITH. 22, BEDFORD ST COVENT GARDEN. S.88 16144

MONTHLY WEATHER CHART, AUGUST, 1879.



1. DISTRIBUTION OF MEAN PRESSURE

2. MOVEMENTS OF DEPRESSIONS.

3. DISTRIBUTION OF MEAN TEMPERATURE

4. RAINFALL

29·65
29·698
29·689
29·70
29·738
29·756
29·75
29·777
29·80
29·843
29·85
29·862
30 6P.M.
22
31
7·8
6P.M.
8A.M.
26
7
6P.M.
(?) 9·10
I 8A.M.(?)
II 8A.M.
LVIII
LXI
LVII
LX
28
27
LIX 8A.M.
6
18
17 8A.M.
15 6P.M.
LVI
16 8A.M.
5 8A.M.
LV
54°
55°
56°
54·3
57°
55·7
56°
55·8
58°
56·7
60°
61°
57·0
59°
60·1
61°
59°
58·5
61°
62°
4·20
3·39
5·03
3·14
3·96
3·93
4·30
5·08
5·26
2·07
5·02
3·23
2·72
3·97
3·51
4·01
5·29
3·10
4·08
4·41
6·52
2·45
7·63
3·19
2·54
3·70
6·22
6·21
8·22
4·54
3·06
6·85
3·01
7·26
4·31
3·41
4·01
2·87
5·03
4·89
5·47
6·07
5·42
7·17
3·23
6·56
5·04
3·33
4·66
4·85
5·92
4·93
5·14
6·62
7·09
3·36
3·19
6·42
5·12
3·08
3·65
8·89
5·49
4·94
7·36
4·55
3·56

To follow Wind Chart for August.

DANGERFIELD LITH. 22 BEDFORD ST COVENT GARDEN 5.88 16144.

REMARKS FOR SEPTEMBER 1879.

(*Tables A. to C., with Monthly Wind and Weather Charts.*)

Wind.—The wind chart for the month shows a somewhat different distribution of winds from that which prevailed during July and August, inasmuch as while the predominant winds at all stations were from Westerly points, Easterly winds were somewhat frequent in the south, but were very little felt in the north, the reverse of what was observed during the two preceding months.

During the first two or three days of the month an anticyclone lay over the Channel and southern England, in which districts light Easterly winds, or calms, prevailed, while moderate South-westerly or Westerly winds blew over the rest of the kingdom. The Westerly current spread southwards and strengthened, in consequence of the passage of low-pressure areas to the northward of Scotland; but on the 4th it became light again, and in a few hours shifted to the Southward, except along the Channel coasts, where it became Easterly. Depressions then appeared on our western coast, and Southerly winds prevailed for some time, till at the close of the 8th they veered to West in the south-west, and soon afterwards Westerly winds became general over England, North-westerly in Ireland, and Easterly in Scotland. On the morning of the 10th Northerly or North-westerly winds blew generally, but in the course of the day a retrograde movement set in, and South-westerly or Westerly winds ensued for several hours. At the close of the 13th light variable winds prevailed, but after a little while they again became Easterly over the south of England, and Westerly further to the northward. Light anticyclonic airs were felt at the close of the 15th, and continued for two or three days, the direction being chiefly Easterly in the south and Westerly in the north; on the 18th they became Northerly, and a couple of days later they backed to West, and freshened somewhat. The direction of the wind was from South-west to North-west till the close of the 22nd, when it backed to South in front of a deep depression which passed up our western coast, and caused strong Southerly and Westerly gales. From the 23rd to the 26th West was the most general direction. On the 27th it backed to South, and fresh or strong winds from that quarter blew till the next day, when they again veered; a little later light variable airs, chiefly from the Eastward, spread over the southern half of the kingdom, and then veered to South, which was the general direction at the close of the month.

Pressure.—The mean pressure for the month was very slightly above the average over the south of England, normal over the central portion of the kingdom, and below the average in the north; the defect in the Hebrides, where it was much larger than over the mainland of Scotland, amounting to as much as ·15 inch. The range of pressure amounted to about an inch and a quarter, and was tolerably uniform all over the kingdom. The lowest readings occurred at the stations in the west of England and in Ireland near the 8th, with depression No. LXIV., but at Kew and in Scotland the minimum was reached with depression No. LXVII. about the 23rd; at none of the observatories did the barometer fall so low as 29 inches. The maximum occurred at Aberdeen on the 27th, but elsewhere higher readings were recorded quite at the commencement of the month.

Movements of the Depressions.—Most of the depressions experienced this month travelled in a northerly or north-easterly direction, their track lying to the northward of our Islands. To this rule there were two exceptions, the first being a moderately deep system, No. LXIV., which, after passing northwards over Ireland, changed its course, and returning a little, moved to the eastward across the north England, while the second was depression No. LXVIII., which was a shallow system secondary to a very deep one which had skirted our northern coasts. Two or three anticyclonic systems were observed, but none of them were of great height.

Temperature.—The mean temperature, though still below the average in several places, was less so than in the two preceding months, while at many stations it was nearly normal; the values varying from about 57° over the south of England to 52° or 51° in the north of Scotland; at Jersey it was 58°·7, and at Glenalmond 49°·5. The maxima occurred at the beginning of the month, generally from the 3rd to the 6th, and the minima during the last week of the month, from the 24th to the 26th, at the majority of stations. At two or three places the range of temperature amounted to 40°, but as a general rule it did not greatly exceed 30°, and in many instances amounted to much less.

Vapour Tension.—The mean values varied from about ·4 inch along the south coast of England to a little over ·3 inch in Scotland, the decrease being more rapid over the southern half of England than further northward. *Relative Humidity* was fairly uniform in its distribution over the kingdom, the mean percentage values ranging from 85 to 90.

Rainfall.—This was a much drier month than the two preceding ones had been, the rainfall being on the whole about normal; in the north-east and east it was a little less than the average, and in the south-west and west rather above it, but as a rule the differences was not large either way. Falls of upwards of an inch in a day were recorded, but not very commonly, the heaviest falls occurring about the 6th and 7th at a good many stations, and about the 23rd and 24th at many others; the largest fall was 3·53 inches, recorded at Mullaghmore on the 7th.

TABLE A., SEPTEMBER.—SHOWING the MEAN and EXTREME PRESSURES and TEMPERATURES recorded at each of the SEVEN SELF-RECORDING OBSERVATORIES of the METEOROLOGICAL OFFICE during the Month of SEPTEMBER 1879; together with the MONTHLY VAPOUR TENSION, the RELATIVE HUMIDITY, and TOTAL RAINFALL.

NAMES OF OBSERVATORIES.	PRESSURE at 32° F. and the Mean Sea Level (In English Inches).						TEMPERATURE In the Shade (In Degrees Fahrenheit).						HYGROMETRIC VALUES.		RAINFALL (In English Inches).
	Mean for the Month.	Extremes.				Range.	Mean for the Month.	Extremes.				Range.	Tension of Vapour (In English Inches).	Relative Humidity (Saturation = 100).	
		Minimum.		Maximum.				Minimum.		Maximum.					
		Reading.	Date.	Reading.	Date.			Reading.	Date.	Reading.	Date.				
	ins.	ins.	D. H.	ins.	D. H.	ins.	°	°	D. H.	°	D. H.	°	in.	%	ins.
Valencia - -	29·932*	29·308†	8th, 10 a.m.	30·451	1st, 11 a.m.	1·143	54·5	45·5	29th, 4 a.m.	61·2	2nd, 3 p.m.	15·7	·360	85	4·778
Armagh - -	·866	·052	8th, 10 p.m.	·402	1st, 11 a.m.	1·350	52·3	38·0	24th, 5 a.m.	65·7	6th, 2 p.m.	27·7	·341	87	3·755
Glasgow - -	·817	·029	23rd, 4 a.m.	·309	1st, 11 a.m.	1·280	51·8	35·8	27th, 4 a.m.	64·3	7th, 3 p.m.	28·5	·313	81	4·018
Aberdeen - -	·800	·021	23rd, 10 a.m.	·249	27th, 4 a.m.	1·228	51·8	34·3	27th, 6 a.m.	64·1	3rd, 4 p.m.	29·8	·306	79	3·365
Falmouth - -	·992	·397	7th, 9 a.m.	·511	1st, 11 p.m.	1·114	55·8	44·9	3rd, 6 a.m.	65·1	18th, 1 p.m.	20·2	·375	84	4·780
Stonyhurst - -	·907	·202‡	9th, 6 a.m.	·435	1st, Noon	1·233	53·0	35·4	30th, 6 a.m.	66·3	6th, 2 p.m. 3 p.m. 7th, Noon	30·9	·327	81	3·382
Kew - -	29·973	29·297	24th, 5 a.m.	30·497	1st, 9 p.m.	1·200	55·8	40·3	26th, 6 a.m.	68·1	3rd, 4 p.m.	27·8	·375	84	2·875

* Means for three days are approximate.

† Lowest reading recorded, but trace lost for 10 hours on this day.

‡ Approximate reading.

TABLE B., SEPTEMBER.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at
The values are not
(The Stations are grouped in Districts, and then arranged in order of

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 9 a.m. and 9 p.m.	AIR TEMPERATURE.									
						Means of			Absolute Extremes.			
			At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.
0. SCOTLAND, N. -	Orkneys (Sandwick Manse) -	ins. 29·701	° 52·0	° 50·4	° 51·2	° 47·4	° 55·8	° 51·6	° 41·6	27th	° 66·1	3rd
1. SCOTLAND, E. -	Glenalmond - - -	—	—	—	—	42·3	56·6	49·5	31·1	27th	62·0	4th
2. ENGLAND, N.E. -	Seaham - - - -	29·874	54·7	51·5	53·1	46·3	60·1	53·2	36·3	29th	68·0	3rd
	Durham* - - -	29·873	55·8	50·1	53·0	45·2	61·3	53·3	31·3	30th	70·3	7th
	Hull - - - -	29·936	55·0	53·0	54·0	47·9	61·3	54·6	34·5	30th	71·5	7th
	Kelstern 𝕸 - - -	29·946	54·4	51·2	52·8	46·1	61·2	53·7	37·4	27th	69·4	7th
3. ENGLAND, E. -	Hillington 𝕸 - - -	29·953	56·6	51·7	54·2	45·6	64·2	54·9	35·2	1st, 27th	74·1	6th
	Audley End (Saffron Walden) 𝕸	29·965	56·8	52·0	54·4	45·6	63·6	54·6	36·2	1st	77·0	6th
	Chigwell Row - - -	30·010	55·9	54·9	55·4	49·0	61·3	55·2	40·1	25th	68·0	3rd
4. MIDLAND COUNTIES.	Wakefield 𝕸 - - -	29·921	54·8	53·2	54·0	47·2	61·4	54·3	30·4	30th	69·8	3rd
	Buxton 𝕸 - - -	29·963	52·3	49·8	51·1	44·0	58·1	51·1	29·0	30th	65·2	3rd
	Cheadle 𝕸 - - -	29·928	52·0	51·5	51·8	46·2	59·6	52·9	37·7	25th	67·6	3rd
	Leicester - - -	29·948	55·0	54·3	54·7	47·4	61·4	54·4	35·2	30th	69·1	3rd
	Uppingham - - -	29·953	54·3	51·5	52·9	46·5	61·8	54·2	36·9	25th	68·3	3rd
	Oscott - - -	29·948	53·5	52·0	52·8	46·5	61·3	53·9	36·6	30th	71·0	3rd
	Churchstoke 𝕸 - -	29·960	53·3	51·2	52·3	46·6	60·0	53·3	31·8	30th	68·6	6th
	Cheltenham 𝕸 - -	29·960	55·5	52·4	54·0	45·8	61·8	53·8	35·6	1st	66·7	3rd
5. ENGLAND, S. -	Marlborough 𝕸 - -	29·989	56·0	52·2	54·1	46·9	63·5	55·2	35·2	1st	70·7	3rd
	Strathfield Turgiss 𝕸 -	29·988	57·4	53·1	55·3	47·0	65·3	56·2	35·7	1st	72·6	3rd
	Ramsgate 𝕸 - - -	30·020	58·7	55·6	57·2	51·7	63·2	57·5	42·0	25th	69·8	3rd
	Folkestone - - -	29·996	58·6	55·1	56·9	50·9	63·6	57·3	41·6	25th	69·5	6th
	Southampton - - -	29·986	57·3	54·9	56·1	49·5	63·8	56·7	39·7	26th	71·1	4th
	Hastings - - -	29·997	57·6	55·6	56·6	51·6	62·7	57·2	40·7	25th	68·9	6th, 19th
6. SCOTLAND, W. -	Laudale - - -	29·774	53·4	52·5	53·0	47·3	58·9	53·1	39·8	27th	66·2	7th
7. ENGLAND, N.W. -	Douglas (Isle of Man) -	29·875	54·6	50·8	52·7	45·7	57·9	51·8	35·1	24th, 29th	61·8	18th
	Llandudno 𝕸 - - -	29·912	56·1	54·3	55·2	50·4	60·1	55·3	42·0	30th	67·0	6th
8. ENGLAND, S.W. -	St. David's - - -	29·947	56·0	54·0	55·0	50·9	59·4	55·2	43·3	1st	66·1	17th
	Caermarthen 𝕸 - -	29·947	56·2	53·3	54·8	48·6	62·7	55·7	38·1	25th	69·8	6th
	Dartmoor 𝕸 - - -	29·986	52·0	49·4	50·7	45·4	56·6	51·0	38·0	2nd	64·9	6th
	Babbacombe 𝕸 - -	29·987	57·6	53·2	55·4	49·6	62·1	55·9	39·2	2nd	68·4	3rd
9. IRELAND, N. -	Londonderry - - -	29·831	53·2	51·4	52·3	47·7	57·0	52·4	38·0	24th	63·6	6th
	Brookeborough - -	29·826	51·4	50·6	51·0	45·0	57·6	51·3	31·8	24th	63·0	4th
	Markree Castle - -	29·844	53·5	50·2	51·9	45·3	58·2	51·8	30·3	24th	64·6	6th
10. IRELAND, S. -	Dublin - - - -	29·908	54·3	53·2	53·8	48·7	59·8	54·3	41·5	24th	67·5	3rd
	Parsonstown - - -	29·910	53·6	51·5	52·6	46·9	59·6	53·3	37·3	24th	66·7	6th
CHANNEL - -	Jersey (St. Aubin's) - -	30·037	60·6	57·1	58·9	53·9	64·6	59·3	46·1	25th	70·8	3rd

NOTE.—The stations marked thus 𝕸 are in connection with the Royal Meteorological Society.

* At Durham the observations were taken at 10 a.m. and 10 p.m. each day.

STATIONS of the SECOND ORDER in the BRITISH ISLANDS, during the Month of SEPTEMBER 1879.
corrected for Diurnal Range.
Latitude, beginning in each case with the Station lying furthest North.)

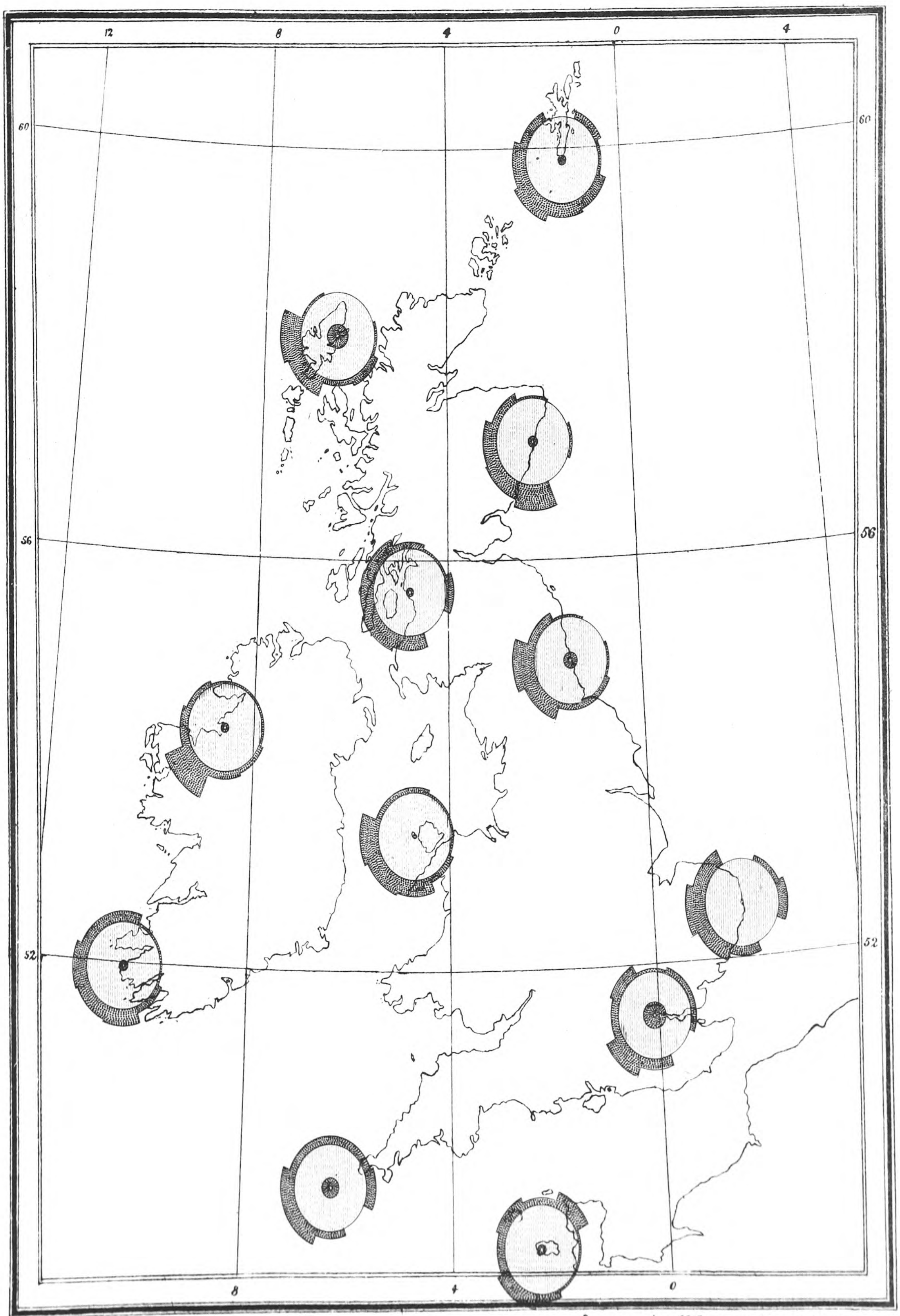
TENSION OF VAPOUR.			RELATIVE HUMIDITY.			AMOUNT OF CLOUD (0 to 10).			RAINFALL.			WEATHER. No. of Days of							WIND. No. of Observations of								
At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
in.	in.	in.	%	%	%				ins.	ins.																	
·315	·318	·317	81	88	85	6·2	6·9	6·6	3·290	·720	27th	23	0	1	0	2	10	5	0	0	0	7	14	15	18	3	3
—	—	—	—	—	—	—	—	—	3·738	·680	27th	18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
·341	·336	·339	79	89	84	5·5	6·1	5·8	1·040	·203	11th	13	0	0	1	2	8	0	0	1	0	3	11	18	6	3	18
·345	·330	·338	78	90	84	6·0	6·2	6·1	1·244	·428	8th	11	0	0	1	2	9	0	3	2	1	5	20	15	7	5	2
·354	·352	·353	82	87	85	6·1	5·2	5·7	2·310	·570	13th	14	0	0	0	9	12	0	1	0	2	2	2	13	19	11	10
·364	·349	·357	86	92	89	6·0	5·2	5·6	3·471	·688	13th	16	0	0	2	9	10	0	4	7	7	1	6	21	7	5	2
·406	·377	·392	88	97	93	6·7	5·9	6·3	3·316	·760	28th	16	0	1	2	6	12	0	5	6	8	5	4	19	5	7	1
·391	·361	·376	85	91	88	5·0	4·9	5·0	3·135	·940	23rd	18	0	0	2	10	8	0	4	0	3	6	12	12	11	2	10
·380	·372	·376	85	87	86	7·5	5·5	6·5	3·340	1·290	23rd	13	0	1	1	4	12	0	6	3	6	5	5	17	6	3	9
·346	·347	·347	81	85	83	6·7	5·5	6·1	1·310	·270	8th	15	0	0	0	4	11	0	2	1	5	6	9	15	16	5	1
·334	·327	·331	85	91	88	7·0	6·1	6·6	4·475	·770	8th	14	0	0	1	3	9	0	3	7	1	1	3	14	13	16	2
·338	·349	·344	87	92	90	7·2	6·0	6·6	2·710	·480	28th	13	0	0	1	4	13	4	5	3	7	3	5	15	10	6	6
·362	·363	·363	84	85	85	8·7	7·0	7·9	3·330	·680	13th	15	0	0	0	3	19	0	2	11	1	3	4	28	1	2	8
·354	·343	·349	83	89	86	6·3	6·6	6·5	2·954	·795	23rd	17	0	0	0	5	15	0	3	3	5	3	15	10	4	3	14
·354	·350	·352	86	90	88	7·7	6·2	7·0	3·150	·540	28th	18	0	0	1	5	16	1	8	6	4	3	15	12	6	3	3
·343	·337	·340	84	89	87	7·0	7·1	7·1	2·788	·702	7th	16	0	0	0	3	13	1	1	1	4	4	1	14	23	4	8
·370	·356	·363	84	90	87	7·6	5·7	6·7	3·260	·720	7th	16	0	0	0	4	13	0	7	4	1	0	13	3	12	5	15
·378	·356	·367	84	91	88	6·9	5·5	6·2	3·978	·720	22nd	17	0	0	0	7	14	0	3	3	2	0	5	11	4	3	29
·395	·372	·384	84	91	88	6·7	6·3	6·5	2·481	·601	23rd	10	0	0	0	6	14	0	2	4	0	6	5	21	9	5	8
·414	·397	·406	84	89	86	6·2	5·2	5·7	3·090	1·210	24th	13	0	0	0	5	10	0	5	11	0	2	5	16	10	4	7
·419	·394	·407	85	90	87	6·1	5·4	5·8	2·560	·900	23rd	13	0	1	3	6	11	3	9	6	5	5	8	10	14	3	0
·414	·396	·405	88	91	90	7·3	4·9	6·1	3·763	·897	23rd	14	0	0	0	5	11	0	3	12	2	2	3	22	4	7	5
·401	·393	·397	84	88	86	6·3	5·4	5·9	2·970	·880	23rd	19	0	0	1	8	14	2	3	19	1	1	8	13	8	3	4
·329	·334	·332	80	84	82	7·8	7·6	7·7	12·920	2·180	1st	28	0	0	0	0	16	5	0	0	2	3	12	21	14	2	6
·362	·353	·358	85	94	89	7·5	6·9	7·2	4·968	·775	8th	19	0	0	0	1	11	3	1	0	3	5	7	14	13	7	10
·373	·362	·368	83	86	84	6·8	6·3	6·6	3·000	·724	26th	17	0	2	2	3	12	0	10	3	1	4	7	8	24	3	0
·377	·373	·375	84	89	86	7·4	6·4	6·9	5·191	1·455	6th	21	0	0	0	1	9	1	8	5	1	2	4	22	8	5	5
·389	·374	·382	85	92	88	7·7	7·1	7·4	5·700	1·050	11th	19	0	0	0	3	17	0	5	1	4	7	0	21	11	0	11
·345	·338	·342	89	95	92	7·1	8·2	7·7	9·420	1·330	6th	17	0	0	1	3	17	0	3	5	7	4	2	12	14	9	4
·396	·372	·384	84	91	87	6·8	6·2	6·5	3·430	·880	23rd	16	0	0	0	5	12	0	5	12	1	1	4	18	11	6	2
·354	·344	·349	87	90	89	8·0	7·9	8·0	5·080	1·260	7th	25	0	0	0	1	16	0	0	0	1	3	6	21	16	4	9
·343	·335	·339	90	91	91	8·9	7·6	8·3	6·487	1·260	7th	19	—	—	—	0	20	7	0	2	2	7	3	15	8	3	20
·357	·332	·345	87	90	89	8·2	8·4	8·3	4·793	1·075	7th	23	0	2	0	0	19	0	2	0	0	6	11	10	8	6	17
·353	·353	·353	83	86	85	6·5	6·1	6·3	2·046	·610	7th	18	0	0	0	2	6	0	1	1	5	3	5	12	22	8	3
·358	·349	·354	87	91	89	8·1	7·9	8·0	4·602	1·078	7th	20	0	2	0	1	19	0	0	1	6	2	10	17	11	7	6
·430	·407	·419	82	87	84	7·4	6·0	6·7	3·592	1·000	23rd	14	0	1	0	2	14	0	2	12	7	2	6	14	7	6	4

TABLE C., SEPTEMBER.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at TELEGRAPHIC REPORTING STATIONS in the BRITISH ISLANDS, during the Month of SEPTEMBER 1879. Observations are made at 8 a.m. daily.

(The Stations are grouped in Districts, and then arranged in order of Latitude, beginning in each case with the Station lying furthest North.)

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 8 a.m.	AIR TEMPERATURE.								TENSION OF VAPOUR.	RELATIVE HUMIDITY.	AMOUNT OF CLOUD.	RAINFALL.			WEATHER. No. of Days of							WIND. No. of Observations of								
				Means of			Absolute Extremes.																									
			At 8 a.m.	Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.				Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
		ins.	°	°	°	°	°		°		in.	%		ins.	ins.																	
0. SCOTLAND, N.	Sumburgh Head	29·688	50·4	45·4	54·7	50·1	40	2nd	58	9th	·323	88	6·6	3·06	0·86	27th	23	0	0	0	4	10	4	0	2	1	4	5	8	6	3	1
	Wick	29·708	51·3	44·6	57·7	51·2	35	25th	63	2nd, 18th	·319	88	7·1	1·70	0·40	11th	18	0	0	0	5	16	5	0	1	0	2	8	8	6	4	1
	Stornoway	29·611	50·8	45·6	54·8	50·2	40	5th, 25th, 27th.	61	7th	·340	91	5·9	4·52	0·65	1st, 5th	19	0	0	0	9	12	7	0	0	1	3	2	8	10	1	5
1. SCOTLAND, E.	Nairn	29·738	50·2	45·9	59·2	52·6	35	27th	68	7th	·296	82	4·5	1·09	0·41	11th	13	0	0	0	11	8	1	0	0	0	1	1	9	8	1	10
	Aberdeen	29·784	51·6	45·6	60·1	52·9	34	27th	66	15th	·315	82	3·9	3·01	1·03	30th	12	0	0	0	17	7	3	1	0	1	0	11	7	6	3	1
	Leith	29·818	52·5	46·7	60·0	53·4	34	27th	69	6th, 7th	·328	83	5·5	1·46	0·27	11th	11	0	0	0	7	8	2	1	0	2	1	1	11	7	3	4
2. ENGLAND, N.E.	Shields	29·875	51·9	45·4	59·5	52·5	37	30th	68	3rd	·334	86	6·8	0·65	0·13	21st	13	0	0	0	6	16	5	1	0	1	2	2	7	11	4	2
	York	29·924	50·9	45·8	61·9	53·9	31	30th	71	7th	·339	88	5·2	2·11	0·29	8th	16	0	0	1	14	12	0	3	1	1	2	7	7	4	5	0
3. ENGLAND, E.	Yarmouth	29·958	55·4	50·4	61·4	55·9	43	1st, 25th	72	3rd	·379	87	4·4	3·46	1·84	23rd	14	0	0	1	12	6	0	0	2	4	0	3	6	9	6	0
	Cambridge	29·972	52·6	46·9	65·7	56·3	37	1st	75	3rd	·367	93	6·8	2·38	0·56	28th	15	0	0	1	9	18	0	4	0	4	0	4	12	1	4	1
4. MIDLAND COUNTIES.	Nottingham	29·955	53·7	46·3	64·7	55·5	33	30th	73	3rd, 7th	·356	86	6·8	3·22	0·88	24th	17	0	1	2	8	15	0	5	1	0	3	6	9	1	1	4
	Oxford	29·970	52·6	48·6	62·0	55·3	40	25th	68	3rd	·375	95	7·8	2·96	0·54	24th	16	0	0	0	6	20	0	6	1	1	0	3	3	9	1	6
5. ENGLAND, S.	London	29·979	55·3	49·4	64·9	57·2	39	1st, 25th	74	3rd	·375	86	6·9	2·88	1·24	23rd	15	0	0	0	6	16	0	1	2	2	0	4	8	3	4	6
	Dover	29·985	57·1	53·4	61·5	57·5	44	25th, 28th	65	6th	·393	84	4·6	2·67	0·73	23rd	15	0	0	0	12	8	3	4	4	2	1	1	7	6	4	1
	Hurst Castle	29·979	55·6	52·4	62·3	57·4	43	2nd	66	4th, 14th, 20th.	·422	95	6·0	3·25	0·87	23rd	16	0	0	0	8	10	1	4	9	2	0	2	4	3	6	0
6. SCOTLAND, W.	Ardrossan	29·824	52·4	48·9	57·4	53·2	38	27th	64	7th	·330	84	8·1	4·97	1·01	27th	22	0	0	0	1	17	7	2	1	3	0	5	7	6	5	1
7. ENGLAND, N.W.	Liverpool	29·914	53·6	50·0	60·0	55·0	41	30th	68	6th	·339	82	6·8	3·07	0·65	11th	17	0	0	0	8	14	1	1	1	2	6	3	9	6	2	0
	Holyhead	29·911	54·3	51·7	59·5	55·6	45	24th, 30th	66	6th	·365	86	7·0	3·32	0·78	8th	19	0	0	1	6	14	4	2	1	1	2	6	7	9	2	0
8. ENGLAND, S.W.	Pembroke	29·946	55·1	52·5	58·8	55·7	45	25th, 30th	65	16th	·364	84	6·5	4·43	1·31	6th	20	0	0	0	5	12	5	2	4	2	2	2	7	5	4	2
	Prawle Point	30·010	55·7	50·9	60·6	55·8	43	25th	67	14th, 15th	·409	92	6·3	2·90	0·73	23rd	17	0	0	0	5	9	1	6	4	1	2	4	5	3	3	2
9. IRELAND, N.	Donaghadee	29·870	51·3	47·6	57·3	52·5	39	25th	61	6th, 20th	·357	95	6·3	3·59	0·56	6th	18	0	0	0	7	12	2	2	1	1	1	3	8	13	1	0
	Mullaghmore	29·826	52·3	49·1	57·5	53·3	40	24th	64	6th	·347	89	8·5	10·36	3·53	7th	25	0	0	0	1	17	10	1	1	1	2	3	15	4	2	1
10. IRELAND, S.	Kingstown	29·914	53·8	49·1	60·9	55·0	42	24th	70	3rd	·325	78	6·8	2·06	0·61	7th	15	0	0	0	3	13	3	0	0	1	2	4	8	9	5	1
	Valencia	29·932	54·6	50·6	59·0	54·8	44	29th	62	2nd, 16th	·370	87	8·7	5·09	0·78	8th	24	0	0	0	0	21	3	4	1	1	2	6	5	6	4	1
	Roche's Point	29·940	53·4	49·8	60·2	55·0	43	1st, 29th 30th.	65	6th, 15th	·358	88	7·3	6·29	1·12	11th	18	0	0	0	4	14	3	4	0	2	0	3	5	10	6	0
CHANNEL ISLANDS	Scilly	29·994	57·2	53·7	60·4	57·1	47	25th	64	2nd, 3rd, 5th.	·423	90	7·7	4·16	0·92	6th	18	0	0	0	3	16	5	3	3	4	0	2	6	6	3	3
	Jersey	29·986	58·2	54·3	63·0	58·7	47	25th	70	3rd	·430	88	7·0	3·67	1·22	23rd	18	0	1	0	3	12	4	3	6	1	1	3	6	4	5	1

MONTHLY WIND CHART FOR SEPTEMBER, 1879.

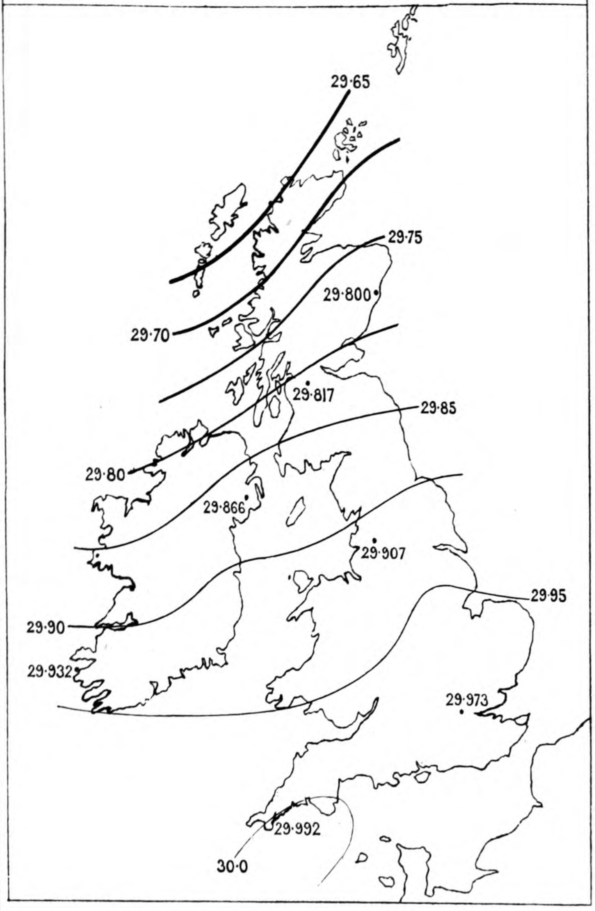

12
8
4
0
4
60
60
56
56
52
52
8
4
0

To face p. 112.

DANGERFIELD, LITH. 22, BEDFORD ST. COVENT GARDEN. 5881614 5.

MONTHLY WEATHER CHART, SEPTEMBER, 1879.

1. DISTRIBUTION OF MEAN PRESSURE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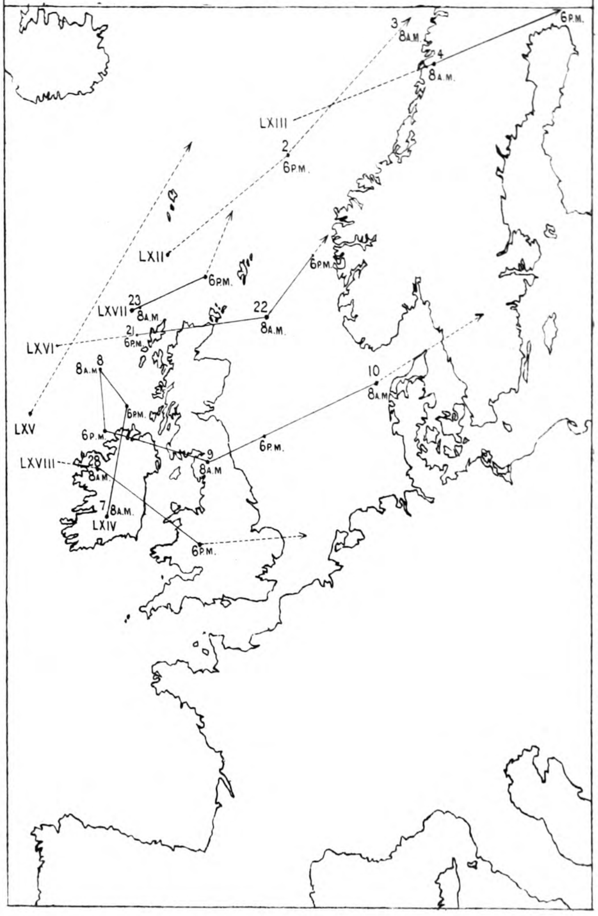
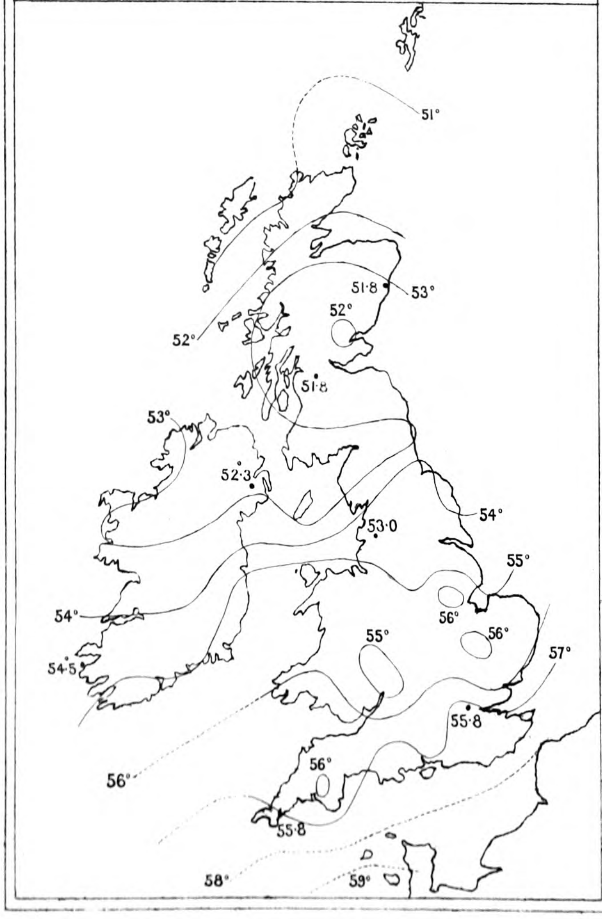
29·800
29·70
29·817
29·85
29·80
29·866
29·907
29·95
29·90
29·932
29·973
29·992
30·0

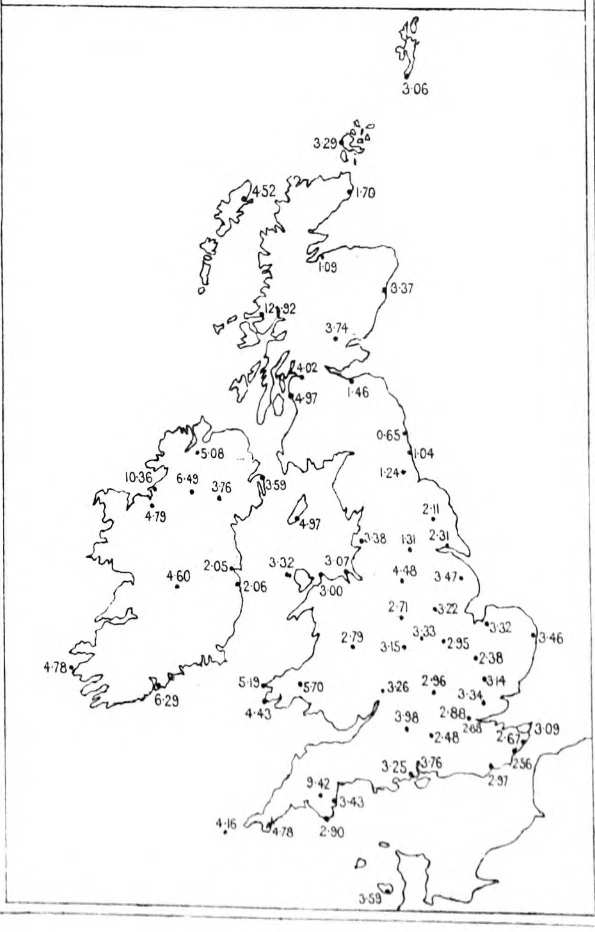
2. MOVEMENTS OF DEPRESSIONS.


3
8 A.M.
4
8 A.M.
6 P.M.
LXIII
2
6 P.M.
LXII
6 P.M.
6 P.M.
23
LXVII
8 A.M.
22
8 A.M.
21
6 P.M.
LXVI
8
8 A.M.
10
8 A.M.
6 P.M.
LXV
6 P.M.
6 P.M.
9
8 A.M.
LXVIII
28
8 A.M.
7
8 A.M.
LXIV
6 P.M.

3. DISTRIBUTION OF MEAN TEMPERATURE


51°
51·8
53°
52°
52°
51·8
53°
52·3
54°
53·0
55°
56°
56°
55°
57°
54°
54·5
55·8
56°
56°
55·8
58°
59°

4. RAINFALL


3·06
3·29
4·52
1·70
1·09
3·37
12·92
3·74
4·02
4·97
1·46
0·65
1·04
5·08
1·24
10·36
6·49
3·76
3·59
4·79
4·97
2·11
2·31
3·38
1·31
3·32
3·07
4·60
2·05
4·48
3·47
2·06
3·00
2·71
3·22
3·32
2·79
3·33
3·15
2·95
3·46
2·38
4·78
5·19
5·70
3·26
2·96
3·14
3·34
6·29
4·43
2·88
3·98
2·48
2·68
3·09
2·67
3·25
3·76
2·56
2·97
3·42
3·43
4·16
4·78
2·90
3·59

To follow Wind Chart for September.

DANGERFIELD LITH. 22, BEDFORD S^T COVENT GARDEN. 3.88.16145

PART IV.

SECTION I.

GENERAL SUMMARY FOR THE QUARTER.

Anticyclonic conditions were prevalent during a great part of this quarter, and although our weather was occasionally affected by some deep depressions observed in the vicinity of our Islands, no disturbance of much importance actually reached us till quite at the close of the year. The mean pressure for the quarter was therefore much above the average; while temperature was again below it, as it had been during each of the preceding quarters of this unusually cold year Rainfall was also much below the mean, and did not amount to one-half the average fall of the preceding 13 years, and only slightly exceeded one-half the fall recorded in the driest year of that period; in this respect the weather was in striking contrast to that of the two quarters which had immediately preceded it.

October 1st–5th.—The distribution of pressure which prevailed over Europe on the morning of the 1st was tolerably simple, readings being uniform and relatively high over nearly the whole of the Continent, while beyond our north-western coasts there lay an apparently deep depression (No. LXIX.), which, however, was travelling away in a northerly direction. With these conditions Southerly winds prevailed over Scotland and the greater part of England, and South-westerly to Westerly winds along the Channel coasts and over Ireland, varying in force from a moderate to a strong breeze over the greater part of the kingdom, but rising to a gale at some of the northern stations. The accompanying weather was, as a rule, dull and cloudy, with rain in many places.

For two or three days the barometer was rather unsteady, owing to the passage of depressions outside our western and northern coasts; but, notwithstanding this, pressure upon the whole increased, and an anticyclone, which had become developed to the southward of England, steadily approached our southern shores. During the early hours of the 5th the last depression of the series arrived, but it kept so far to the westward that it was only at the most exposed stations in the south-west that any appreciable fall of the mercury was recorded. At Valencia, however, a South-easterly gale was experienced, and a fresh wind blew at the mouth of the Channel. After this a steady rise of the barometer ensued, and by the evening the anticyclone had spread itself over the whole of the United Kingdom, accompanied by light to moderate winds, and generally fine weather.

October 6th–15th.—This was an anticyclonic period, during which the barometer continued high and steady, with quiet fine weather—although a good deal of fog and gloom was experienced—and with a temperature generally low, the wind being Easterly in the south and Westerly in the north, but with calms, or light variable airs, over the central portion of the kingdom. The anticyclone remained over Great Britain until the 13th, when the barometer began to fall in the east, and the system moved away over the ocean to the westward. At the same time a large and deep depression (No. LXX.) appeared over the northern part of Scandinavia, travelling in an easterly direction, but at too great a distance to influence much the barometer at any of our stations. A small secondary disturbance, however, passed down our eastern coasts on the 14th, and caused the wind to veer to the Northward, the change being accompanied by a marked sudden fall of temperature, which is well shown by the thermograms on Plate LVIII., the southward progress of the disturbance being indicated by the time of the occurrence of this phenomenon.

E 52140. 1.—2/89. Wt. 8441.

October 16th–25th.—Early on the 16th the barometer began to fall more decidedly at Valencia, and in the course of the ensuing twenty-four hours the movement became extended to the rest of the kingdom. It was only in the north, however, that the fall was large, for while at Aberdeen it amounted to eight-tenths of an inch it did not exceed a quarter of an inch at Falmouth. It was caused by the arrival of depression No. LXXI., a large and deep disturbance, with a secondary centre which passed close to the north of Scotland and at 8 a.m. of the 17th lay between the Shetlands and Norway. A general increase of temperature accompanied this depression, and a few hours later this was followed by a further rise of the thermometer, which occurred upon the arrival of the next depression, No. LXXII. The track of this latter system lay to the northward of Scotland, and the fall of the barometer which accompanied it was therefore again greatest at the northern stations, the mercury sinking to 28·75 inches at the Shetlands. The barometer remained low for some hours, and it was not until the 20th that a recovery began, but the mercury then rose briskly and continued to rise till the 22nd, when the movement was checked by a new low-pressure system (No. LXXIII.) travelling in an easterly direction, but at a considerable distance to the northward of our Islands. On the 23rd a fresh gradual fall began, and a large and very shallow low-pressure area spread over the kingdom, till on the 25th a rise set in, accompanied by a fall of temperature, which soon brought about an entire change in the general distribution of pressure.

October 26th–November 8th.—The rise of the barometer continued throughout the 26th and 27th, and although at first it was brisk at the northern stations only, it soon became so in the south also, the area of low pressure becoming filled up while an anticyclonic system which had appeared over Sweden gradually approached our shores. From the 28th till the close of this period the barometer continued high and fairly steady, there being only one or two slight oscillations, caused by the arrival of depressions upon the Norwegian coast, and which were scarcely felt at all at our southern stations. The principal of these was due to depression No. LXXIV., which travelled across Scandinavia on the 1st, and as at the same time the anticyclone moved further to the westward, gradients were formed over England and Scotland for rather strong Northerly winds. Previously to this strong Easterly winds had been experienced over the south of England and northern France, in consequence of an area of low readings which had continued with some persistence over the Peninsula, but this now became filled up and the Easterly wind disappeared, and as, at the same time the anticyclone on our western coast increased in height and moved southward a little, the Northerly wind diminished in force, and at the northern stations backed to the westward. On the 7th the high-pressure area began to move to the eastward again, so that on the 8th it covered England, northern France, and the Netherlands, while a moderately deep depression lay to the northward over Finland and another was approaching from the westward; with these conditions a steady fall of the barometer was in progress at all our stations, and in the west the wind backed and increased in force.

November 9th–12th.—The barometer continued to fall at Aberdeen till mid-day of the 9th, but at the southern stations the movement continued for several hours longer, during which time a very shallow secondary depression was extending itself southwards over the kingdom; this depression is exhibited by the weather chart for the morning of the 10th (Chart Plate No. 18) as covering the greater part of England while the main disturbance (No. LXXVI.), which was both large and deep, lay over Lapland, it was accompanied by a shift of wind to North and by a fall of temperature. A brief recovery of pressure followed, but during the latter half of the 10th a new fall set in, which in the north proved to be both rapid and extensive. It preceded another deep depression (No. LXXVII.), which also passed to the northward of Scotland, but much nearer than its immediate predecessor had done, still the fall of the barometer at the southern stations was not very great, the anticyclone continuing to the south-westward of England, and by midnight of the 11th a fresh general recovery of pressure had begun which continued throughout the following day. Meantime the depression was travelling away across Denmark to the Baltic, and the anticyclone was becoming re-established over the United Kingdom, where strong Northerly winds continued to blow for some hours, with falling temperature and fine weather.

November 13th–20th.—The anticyclone first advanced from the westward over the British Isles, and then changing the direction of its motion, moved for a short time to the south of England and the north of France, after which it spread again in a north-easterly direction to Scandinavia and northern Russia, where it finally became dispersed. Throughout this interval the variations of pressure at the southern stations were only slight, but in the north a considerable movement took place between the 16th and 18th, when a brisk fall and rise was caused by the passage of a depression beyond our northern coasts; it was at this time that the anticyclone moved towards the Channel, and, gradients being thus formed for Westerly winds, the movement was accompanied by a considerable rise of temperature all over the kingdom. On the 19th, with an Easterly wind, temperature began to fall again, and continued to do so throughout the following day; pressure also began to give way at the southern stations, and this movement gradually spread northwards with an increasing wind and cold snowy weather.

November 21st–30th.—A shallow depression (No. LXXVIII.) now began to show itself near our southern coasts, and for a day or two the barometer continued low and unsteady, the strong Easterly wind meanwhile backing to north over Ireland, and to West in the Channel, and then becoming generally light and more variable in direction. On the 23rd the barometer rose at our northern stations, and by the following day a fresh high-pressure system had become developed to the northward of our Islands, and as at the same time a shallow depression existed at the mouth of the Channel, gradients for Easterly winds again became established, with cold and wintry weather. The anticyclone remained for some hours over Scandinavia, but on the 25th a very decided fall of the barometer took place over that region, and the system became transferred to the northern half of the British Isles, and a few hours afterwards it moved further westwards still to the neighbourhood of the Hebrides. On the 28th an area of low pressure passed across Scandinavia and simultaneously pressure gave way steadily over the United Kingdom, the wind backing to the Northward with a further decrease of temperature. At the mouth of the Channel, however, the Easterly wind still held and continued to blow as it had done for some days with considerable strength, but gradually this gave way, and by the 30th moderate or fresh Northerly winds had become general, with cold, but upon the whole fine, weather, although with occasional showers of snow. At the close of the 30th the region of highest pressure lay to the westward of Ireland, while depressions were reported both from the North Sea and from the south of France.

December 1st–6th.—An interval of cold wintry and rather unsettled weather now ensued. The depression in the south of France travelled away to the eastward and disappeared, while the shallower one over the North Sea moved to the southward and apparently became filled up over France, so that on the 2nd pressure had become very uniform over the United Kingdom, with light winds and very cold weather, the temperature at Nottingham at 8 a.m. being as low as 5°. In the west, however, the barometer had begun to fall, and by the evening the distribution of pressure had become somewhat complex, a large area of low pressure having shown itself off our south-western coasts, while a small and shallow but distinctly marked disturbance existed upon our eastern littoral, and another and deeper one still further to the eastward over Germany. By the morning of the 3rd the second of these depressions had crossed the North Sea to Holland, but the decrease of pressure in the south-west was still going on, with South-easterly winds and rather high temperature, indicating the approach of an important depression towards the Bay of Biscay. The centre of this new system (No. LXXIX.) did not reach north-western France till the afternoon of the 4th, but in the meantime gradients became steep over the Channel coasts and the wind backed to East and increased to a gale, a strong Westerly gale blowing over the southern part of France during the afternoon of the 4th. The barometer began to rise in the south-west during the 4th, and by the close of the day the movement had become extended to our south-eastern stations also, the depression travelling in an easterly direction across northern France to Germany, where it was observed on the morning of the 5th. Meantime another very shallow depression, unaccompanied by any noteworthy increase of wind, approached our northern coasts, causing the mercury there to continue falling till about mid-day on the 5th when a rise began there also, and by the close of the day the movement had become general; a Northerly wind was then blowing over the greater part of the kingdom, but along the Channel coasts a Westerly wind had set in with warmer weather.

December 6th–20th.—Throughout the 6th the barometer rose very briskly at all our stations, and over the United Kingdom and the north-east of France an anticyclone became developed which continued to govern our weather for a rather lengthened interval. The subsequent changes of pressure were only slight and gradual, due to the movements of the high-pressure system, which, however, were not extensive, and to the arrival at the northern limits of our area of one or two depressions which were too far removed to do more than cause a small oscillation of the mercury in Scotland. The anticyclone lay chiefly to the south-eastward of England, but for a few days it embraced the whole of the United Kingdom, and for a short time the barometer at some of our stations rose to above 30·8 inches. The winds during this interval were light, and as a rule Easterly in the south, Southerly in the west, and Westerly or North-westerly in the north, the accompanying weather being dry, and in some districts foggy, and for a portion of the time extremely cold; at Cambridge the temperature at 8 a.m. on the 8th was down to zero Fahrenheit, whilst at York it was only 3°, and at Nottingham 5°. On Plates LXIX. and LXX. very sudden rises of temperature are shown to have occurred at Aberdeen on the 11th, at Armagh and Glasgow on the 12th, and at Stonyhurst on the 13th, after which day the weather became generally warmer, although in the south-east of England the improvement did not last very many hours. On the 20th a very general fall of the barometer set in, and simultaneously the anticyclone moved eastwards to Germany, where it remained till the close of the month, when it moved southwards to the south of France and the Mediterranean; the system did not disperse, however, but continued on into the succeeding month, when it once more moved northwards and again spread itself over the British Isles. Meanwhile a series of depressions arrived and caused a spell of unsettled weather.

December 21st–31st.—The barometer continued to fall throughout the 21st, briskly in the north and west, but only slightly in the south and south-east of England, and fresh to strong Southerly winds with higher temperatures were experienced over the first named region, although the cold weather with light airs and fogs continued to prevail in the south-east. The depression which caused this fall of the barometer travelled away to the north-west, but its track lay at too great a distance from our shores to cause a general break up of the weather, and after it had passed the barometer rose again generally. Early on the 24th another system of low pressure (No. LXXX.) arrived, travelling to the eastward but rather closer to our shores, and this caused another oscillation of the barometer; but what proved to be a far more important fall began to show itself at the western stations on the 25th, accompanied by a backing of the wind to South, and after the fall had continued and extended itself throughout the following day it became very rapid indeed at the northern stations on the 27th. With the approach of this system (No. LXXXI.) which proved to be very deep, the temperature rapidly increased everywhere, and the wind, which had become generally Southerly or South-westerly, rose to a fresh or strong gale. Over the northern half of the kingdom a very brief but rapid rise of the mercury succeeded the passage of the depression, but within twelve hours from its commencement this was followed by a still more abrupt fall, and before the close of the 28th another very deep disturbance, No. LXXXII., had passed over Scotland, travelling rapidly towards Norway. A strong Southerly to Westerly gale accompanied this depression, which attained considerable notoriety from the fact that it caused the overthrow of the railway bridge across the Firth of Tay. Before midnight the barometer was rising very rapidly again at Aberdeen, the recovery having begun still earlier at the stations lying more to the westward, and next day the depression disappeared over Norway. In the south, however, no abrupt fall of the barometer had taken place, the mercury giving way slowly and continuously without any rise after the depressions had passed. After the 28th till the end of the month the barometer continued low and the weather remained unsettled; a new deep depression (No. LXXXIII.) passed close to our northern coasts during the night of the 29th, and although its track lay beyond our north-western coasts it affected the barometer all over the kingdom, and caused a strong Westerly wind, which at many stations amounted to a gale. This depression was soon followed by another (No. LXXXIV.), the last observed in the month, but in this case the system was further removed from our shores, and little can be ascertained of its character, while its influence upon the barometer was only slight; it was, however, accompanied by a considerable rise of temperature.

At the close of the month the barometer was low over the greater part of the United Kingdom and the whole of Scandinavia, while the anticyclonic system No. XXII. still lay over the southern half of France and the Peninsula; gradients were therefore rather steep, and a Westerly gale was blowing on the west coast of France, over the Channel, and at many of our western stations, with squally, dull, and rainy weather.

SECTION II.

TABLE OF CYCLONIC SYSTEMS.—OCTOBER 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. LXIX. **October 1.**	No. LXX. **October 13-14.**	No. LXXI. **October 16-18.**
Form	Unknown	Elliptical	Elongated
Size	Very large	Very large	Very large
Depth	Probably deep	Deep	Deep
Where first Observed	To the westward of Scotland	Over the north of Norway	Near the north of Scotland
Direction of Motion	Northerly	Easterly	Easterly
Rate of Motion	Doubtful	Moderate	Moderate
Regions passed over by Steepest Gradients.	The British Isles and North Sea	Scadinavia, the Baltic, and Finland	The British Isles, the North Sea, and Scandinavia.
Termination	Disappeared to the northward of Scotland.	Passed away over Finland	Disappeared over Russia
Time under Observation	About one day	About 24 hours	About 30 hours
Accompanying Winds	Southerly gale on east coast of Scotland; fresh Southerly wind on east coast of England; fresh or strong Westerly winds elsewhere.	Moderate to fresh Westerly winds over Scotland; but a strong West, to North-west and North gale over Scandinavia and the Baltic.	Strong Westerly winds and gales, veering to North-west and North, and moderating. Southerly gales were felt in Denmark, Sweden, and the Baltic.
„ Weather	At first cloudy or dull, with rain at most of our stations; then finer.	Generally dry, but dull over the British Isles.	Dull and cloudy, and very unsettled
„ Rainfall	Pretty general, but everywhere slight except in the north.	Very slight and partial over the British Isles.	Very local and nowhere heavy
REMARKS	This depression was one of a series which at this time was passing outside our north-western coasts. The rise of the barometer, which ensued upon the passage of its centre, was checked a few hours later, on the 2nd, by the approach of a second centre; and again next day another fall was caused by a third system, apparently much further off. A small secondary centre lay over England on the 1st, while the main depression was near the Hebrides, but it did not cause much disturbance.	This depression passed far to the northward of the British Islands; and it was only in the north of Scotland that the barometer was affected by it, and there only to a slight extent. Over Scandinavia the barometric gradients were steep and the accompanying winds strong.	The centre of this system passed, apparently, close to the Shetlands. Further to the northward, however, there was a stil deeper depression, moving across the north of Norway, to which this system was evidently secondary. The northern and principal disturbance disappeared over Finland on the 19th.

SECTION II.

TABLE OF CYCLONIC SYSTEMS.—OCTOBER–NOVEMBER 1879.

No. LXXII. **October 19-21.**	No. LXXIII. **October 22-23.**	No. LXXIV. **November 1-3.**	No. LXXV. **November 5-7.**
Elliptical	Probably elliptical	Circular	Elongated.
Very large	Very large	Large	Very large.
Deep	Moderate	Moderate	Moderate.
To the northward of Scotland	Northern Scandinavia	Off the coast of Norway	On the north coast of Norway.
Easterly	Easterly	South-easterly, then easterly	South-easterly.
Moderate	Doubtful	Moderate	Moderate
The British Isles, the North Sea, and the Netherlands.	Scandinavia and the Baltic	The east coast of Britain, the North Sea, Scandinavia, and Denmark.	The North Sea and Germany, and Scandinavia.
Travelled away towards Russia	Disappeared over Finland	Disappeared over Russia	Travelled away over Russia.
About two days	Less than a day	About 48 hours	About 48 hours.
Strong Westerly winds and gales, veering to North-west, and at our northern stations to North.	Light to moderate Westerly wind over the British Isles. Over southern Sweden and Norway a Westerly gale was experienced.	Northerly, fresh generally, rising to a gale in places.	Westerly or North-westerly, moderate to strong over the British Isles, but rising to a gale over Scandinavia, Denmark, and the Baltic.
Unsettled and cloudy, but clearing up later over the northern half of the kingdom.	Warm and dull, with rain	Cloudy or dull, with snow in the north-east of Scotland, and snow or rain on our east coast, then generally fine.	Rather cloudy, but generally fine.
Very general, and in places heavy	Rain fell in most parts of the United Kingdom, but nowhere heavily.	General on the north and east coasts and over the greater part of England. At Shields it was heavy.	Very slight, and limited chiefly to the northern stations.
The centre of this system passed to the northward of Scotland, and travelled across Scandinavia. Its approach was accompanied by a considerable rise of temperature, but as its centre passed away, and the wind veered, the thermometer fell again very rapidly, and for a short time fine cold weather ensued.	The centre of this disturbance passed a long way to the northward of Scotland, and it was only on the morning of the 23rd, when it had reached Sweden and the Gulf of Bothnia, that it came under observation. Pressure over the British Isles was nowhere much affected, and at the southern stations the barometers scarcely fell at all.	This disturbance kept entirely to the northward of Great Britain, and while the barometers in Scotland were only slightly affected by it, those in the south of England did not fall at all. Its course at first was south-easterly, but after reaching Sweden it travelled to the eastward over the Baltic to Russia.	This disturbance travelled over the extreme north of Norway, and down the Gulf of Bothnia, to western Russia. The centre of an anticyclone lay near our south-western coasts during the interval, and the gradients became rather steep, but except in the Shetlands the wind did not reach the force of a gale at any of our stations.

TABLE OF CYCLONIC SYSTEMS.—NOVEMBER 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. LXXVI. **November 9-10.**	No. LXXVII. **November 11-13.**	No. LXXVIII. **November 21-22.**
Form	Doubtful	Elliptical	Nearly circular, but varying
Size	Large	Large	Moderate
Depth	Deep	Deep	Shallow
Where first observed	On the north-western coast of Norway	To the northward of Scotland	Over northern France, the Channel, and southern England.
Direction of Motion	Probably south-easterly	East-south-easterly	Northerly
Rate of Motion	Doubtful	Moderate	Slow
Regions passed over by steepest Gradients.	Scandinavia and adjoining regions	The British Islands, northern France, and the Netherlands.	The British Isles and North Sea
Termination	Disappeared over Lapland	Travelled away over Russia	Disappeared to the northward of Scotland.
Time under Observation	About one day	Nearly two days	About a day and a half
Accompanying Winds	Fresh Westerly winds at our northern stations, and moderate Southerly winds in England and Ireland. A Westerly gale blew over Scandinavia.	Westerly veering to North; strong to a gale.	Fresh or strong Easterly winds over the northern half of the kingdom, and fresh Westerly winds over the north of France, becoming light and variable.
„ Weather	Dull or cloudy, with mist or fog in places.	At first cloudy and dull with rain, then generally fine over the British Isles.	At first fine in the north and west, then unsettled generally. A good deal of snow or rain at many stations.
„ Rainfall	Rain fell pretty generally, and in the north and west rather heavily.	Slight rain fell in most parts of the British Isles.	Very general, but heavy at only a few stations.
REMARKS	This depression followed closely upon another, which had a few hours before travelled over the same region. Both were, however, so far to the northward that very little can be said with certainty as to their character, except that they were both deep. They only just came within the northern limits of our area.	This system was first observed to the northward of the British Isles, its centre passing near to the Shetland Islands on the 11th. Its course was at first to the south-eastward, and on the morning of the 12th its centre lay over Denmark; thence it moved in a more easterly direction to the Baltic Provinces, and finally across Russia beyond the limits embraced by our observations.	This system was well marked, and was apparently formed near the Channel on the morning of the 21st. Owing to the high pressure over Scandinavia the gradients for Easterly winds were rather steep, and the wind rose to a gale at several stations.

TABLE OF CYCLONIC SYSTEMS.—DECEMBER 1879.

No. LXXIX. **December 3-5.**	No. LXXX. **December 24-25.**	No. LXXXI. **December 27-28.**
Elliptical - - - - - - -	Doubtful - - - - -	Doubtful.
Moderate - - - - - - -	Large - - - - - - - -	Large.
Moderate - - - - - - -	Deep - - - - - - - -	Very deep.
The Bay of Biscay - - - - -	Over the north of Scandinavia - - -	To the west of Scotland.
At first northerly, then easterly - - -	Probably easterly - - - - - -	North-easterly.
At first slow, then rapid - - - -	Doubtful - - - - - - -	Moderate.
The Bay of Biscay, France, and the Channel -	Scandinavia and adjoining regions - - -	The British Isles, the North Sea, and Scandinavia.
Travelled away across Austria - - -	Disappeared over Lapland - - - -	Travelled away to the northward of Norway.
Less than two days - - - - - -	About one day - - - - - -	About 24 hours.
Moderate Easterly wind over central England, but an Easterly gale over southern England and the Channel, backing to North. A strong Southerly gale was experienced in the Bay of Biscay, veering to West.	Fresh Westerly winds which rose to a gale in the Shetlands. Over Scandinavia, Denmark, and the Baltic, the wind veered from South-west to North-west, and blew a strong gale.	Southerly, veering to South-west, and in the north to West; a strong gale in the west and north, fresh to strong elsewhere.
Generally fine and cold over the British Isles; dull with rain and snow over France.	Moderately fine over the greater part of the British Isles.	Very unsettled and cloudy, with rain.
A slight fall of snow took place at a few of our stations, but in France the fall was generally large.	A slight fall at some of the western stations	Very general, and at the northern and western stations the fall was heavy.
The centre of this well-marked depression was not far from Lorient on the morning of the 4th, and during the day it apparently remained nearly stationary. It then moved very quickly away to the eastward towards Austria, where it passed beyond the area embraced by our observations. The wind blew with great violence upon the western coast of France.	Only a portion of this system came within the area covered by our observations, and consequently its characteristics cannot be very definitely ascertained. Its course lay too far to the northward for it to affect in a marked manner the movements of the barometer over Great Britain.	The track of this depression lay outside our north-western coasts, and therefore the whole of the system never came under observation. The accompanying gradients were, however, steep, and the wind at the western stations blew with considerable strength. The centre of the depression apparently kept to the westward of the Norwegian coast, or only touched it at its northern extremity.

TABLE OF CYCLONIC SYSTEMS.—DECEMBER 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. LXXXII. December 28-29.	No. LXXXIII. December 30.	No. LXXXIV. December 31.
Form	Irregular	Doubtful	Doubtful.
Size	Large	Large	Large.
Depth	Very deep	Deep	Deep.
Where first Observed	Near the Hebrides	Off our north-western coasts	Off the west of Scotland.
Direction of Motion	North-easterly	North-north-eastwards	Apparently northward.
Rate of Motion	Rapid	Rapid	Probably rapid.
Regions passed over by Steepest Gradients.	The British Isles, North of France, the North Sea, and Scandinavia.	The British Isles, the North Sea, and north of France.	The British Isles and north of France.
Termination	Disappeared to the northward of Norway.	Travelled away past the coast of Norway.	Disappeared to the northward of Scotland.
Time under Observation	About 24 hours	Less than one day	About half a day.
Accompanying Winds	Generally Westerly, a fresh to strong gale, which was particularly severe over the northern portion of the kingdom.	Southerly to Westerly; fresh to strong gale on all our coasts, especially severe in the south-west.	Southerly in the north, Westerly elsewhere; strong generally, rising to a gale at many southern and western stations.
„ Weather	Dull, squally, and wet; clearing up on the 29th.	Dull, except in the east of England and over north of France, with heavy squalls and showers, and, in places, thunder and lightning.	Dull, squally, and rainy.
„ Rainfall	Tolerably general, but heavy only in the north.	Very general, but not as a rule very heavy.	Very general, and at a few stations heavy.
REMARKS	This depression followed very closely upon its immediate predecessor, less than 24 hours intervening between the passage of the centres of the two systems. The accompanying gale was especially severe over the northern portion of the kingdom, the wind reaching its highest force in the evening of the 28th, when the railway-bridge crossing the Firth of Tay was blown over. By 8 a.m. on the morning of the 29th, the disturbance had reached the coast of Norway, and Southerly to Westerly gales were blowing over the southern half of Scandinavia.	Only a portion of this disturbance reached our shores, the track of the system lying just to the westward of the Hebrides. The barometer was affected, however, over a larger area of our islands than in the case of the preceding system, when the fall of the mercury at our southern stations was only slight. In this case also the accompanying gale was most severe at the south-western stations.	This system kept entirely to the westward of our islands, and therefore no particulars can be given as to some of its characteristics. The steepest gradients were observed near the Channel, along the coast of which a strong gale was experienced.

TABLES OF GALES.

No. 21. (CYCLONIC SYSTEM, No. LXXVII.)

Stations.	Velocity 30-40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour.				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks.
	Commenced.	Direction of Wind.	Commenced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
Nov. 11-13, 1879.													
Sandwick	Midnt. (11th).	N.W.byN	1 a.m. (12th).	N.N.W.	46	19	10 p.m. (12th).	N.N.E.	22	1 a.m. (12th).	N.N.W.	59	—
Aberdeen	3 a.m. (12th).	N.W.by W.	4 a.m. (12th). 6 a.m. (12th).	N.W.b.W. N.W.b.W.	43 40	1 1	6 p.m. (12th).	W.N.W	15	4 a.m. (12th).	N.W.b.W.	43	—
	7 p.m. (12th).	W.N.W.	—	—	—	—	11 p.m. (12th).	N.W.b.W.	4	9 p.m. (12th).	W.N.W.	38	—
Alnwick Castle.	5 p.m. (11th).	W. by N.	—	—	—	—	10 p.m. (11th).	W. by N.	5	6 p.m. (11th).	W.	37	—
	Midnt. (11th).	W.N.W.	—	—	—	—	2 a.m. (12th).	N.W.b.W.	2	1 a.m. (12th).	N.W.b.W.	31	37 miles per hour were again recorded at 4 a.m. 12th, when the clock stopped, and the subsequent record was lost.
Seaham	11 a.m. (12th).	N.W.byN.	—	—	—	—	3 p.m. (12th).	N.W.byN.	4	Noon (12th). 2 p.m. (12th).	N. by W. N.W.byN.	32	
Stonyhurst.	7 p.m. (11th).	W. byS.	2 a.m. (12th).	W.N.W.	40	1	6 a.m. (12th).	W.N.W.	11	2 a.m. (12th).	W.N.W.	40	
Holyhead.	8 a.m. (11th).	S.W. by S.	—	—	—	—	1 p.m. (11th).	W.S.W.	5	10 a.m. (11th).	S.W.byS.	38	—
	2 p.m. (11th).	W.S.W.	7 p.m. (11th). 9 p.m. (12th). 1 a.m. (13th).	W. N.W. byN. N.W. byN.	47 41 41	24 1 1	7 a.m. (13th).	N. by E.	41	6 a.m (12th).	N.W.	58	—
Yarmouth	5 a.m. (12th).	N.W.b.W.	—	—	—	—	9 a.m. (12th).	N.W.	4	6 a.m. (12th).	N.W.b.W.	33	—

No. 22. (CYCLONIC SYSTEM, No. LXXVIII.)

Stations.	Commenced.	Direction of Wind.	Commenced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.	Total No. of Hours the Vel. above 30 Mls.	Hour.	Direction of Wind.	Velocity.	Remarks.
Nov. 19-22, 1879.													
Aberdeen.	6 a.m. (21st).	N.E. byE.	—	—	—	—	6 p.m. (21st).	E. by N.	12	11 a.m. (21st).	E.N.E.	38	—
	9 p.m. (21st).	E. by N.	—	—	—	—	4 a.m. (22nd).	E.N.E.	7	3 a.m. (22nd).	E.N.E.	36	—
Alnwick Castle.	4 a.m. (21st).	E.N.E.	—	—	—	—	1 p.m. (21st).	E.	9	4 & 9 a.m. (21st).	E.N.E.	35	—
Seaham	10 a.m. (20th).	N.E. by E.	—	—	—	—	2 p.m. (20th).	E.N.E.	4	11 a.m. (20th). 1 p.m. (20th).	N.E. by E E.N.E.	32	—
	6 p.m. (20th).	N.E. by E.	—	—	—	—	Midnt. (20th).	N.E. by N.	6	9 p.m. (20th).	N.E.	35	—
	1 a.m. (21st).	N.E. by N.	6 a.m. (21st). 8 a.m. (21st).	N.E. by N. N.E. by N.	42 43	1 3	Noon (21st).	E.N.E.	11	9 a.m. (21st).	N.E. by N.	46	—
Holyhead.	11 a.m. (20th).	E.N.E.	—	—	—	—	7 p.m. (20th).	E.N.E.	8	1 & 2 p.m. (20th). 5 p.m. (20th).	E.N.E. E. by N.	39	—
	8 p.m. (20th).	N.E. by E.	9 p.m. (20th). 6 a.m. (21st).	N.E. by E. N.E. by N.	42 49	4 8	8 p.m. (21st).	E.N.E	24	Noon (21st).	N.N.E.	51	—
Yarmouth	7 p.m. (19th).	E. by N.	10 p.m. (19th).	E.	47	31	9 a.m. (21st).	E.S.E.	38	8 a.m. (20th).	E. by N.	53	—

No. 23. (Cyclonic System, No. LXXIX.)

Stations.	Velocity 30-40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour.				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks.
	Commenced.	Direction of Wind.	Commenced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
Dec. 3-5, 1879.													
Sandwick	Noon (4th).	N.W.by N.	—	—	—	—	3 p.m. (4th).	N.W. by N.	3	1 p.m. (4th).	N.W. by N.	36	—
Falmouth.	8 a.m. (3rd).	E.S.E.	4 p.m. (3rd). 1 p.m. (4th).	E. N.N.E.	47 40	20 2	5 p.m. (4th).	N.	33	8 p.m. (3rd). 8 a.m. (4th). 9 a.m. (4th).	E. N.E.by E. N.E.	51	—
	7 p.m. (4th).	N.	—	—	—	—	10 p.m. (4th).	N.	3	9 p.m. (4th).	N.	33	—
Yarmouth.	10 a.m. (3rd).	N.E.by E.	—	—	—	—	3 p.m. (3rd).	E.S.E.	5	10 a.m. (3rd). Noon (3rd).	N.E.by E. E.	33	—
	8 a.m. (4th).	S.E. by E.	10 a.m. (4th).	E. by S.	44	8	9 p.m. (4th).	E.N.E.	13	2 p.m. (4th).	E.	47	—
	—	—	10 p.m. (4th).	E.N.E.	43	7	7 a.m. (5th).	N.E.by E.	9	11 p.m. (4th).	E.N.E.	46	—

No. 24. (Cyclonic System, No. LXXX.)

Dec. 22-25, 1879.													
Sandwick.	11 p.m. (22nd).	S.W.by W.	—	—	—	—	3 a.m. (23rd).	S.W.by W.	4	2 a.m. (23rd).	S.W.by W.	33	—
	4 a.m. (23rd).	S.W.by W.	—	—	—	—	6 a.m. (23rd).	S.W.by W.	2	4 a.m. (23rd).	S.W.by W.	31	32 miles were recorded at 7 a.m., and 31 miles at 9 and 10 a.m. 23rd.
	9 a.m. (24th).	S.W.by W.	1 p.m. (24th).	W.S.W.	45	13	4 a.m. (25th).	N.W.b.W.	19	11 p.m. (24th).	W.	53	—
Alnwick Castle.	6 p.m. (22nd).	S.W. by W.	9 p.m. (22nd). 3 a.m. (23rd). 8 a.m. (23rd).	S.W. S.W.by W. W. by S.	45 46 47	5 3 5	3 p.m. (23rd).	W.S.W.	21	Noon (23rd).	W.S.W.	51	—
Holyhead.	4 a.m. (23rd).	S.	—	—	—	—	10 a.m. (23rd).	S. by W.	6	8 a.m. (23rd).	S.	34	—
	11 a.m. (23rd).	S.	2 p.m. (23rd). 9 p.m. (23rd).	S. S.	40 41	3 1	9 a.m. (24th).	S.W.	22	2 p.m. (23rd).	S.	42	—
Valencia	5 p.m. (23rd).	S.	11 p.m. (23rd).	S. by W.	40	4	4 a.m. (24th).	N.W.b.W.	11	11 p.m. (23rd).	S. by W.	41	—

No. 25. (Cyclonic System, No. LXXXI.)

Stations.	Velocity. 30-40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour.				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks.
	Com-menced.	Direction of Wind.	Com-menced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
Dec. 26-28, 1879.													
Sand-wick.	2 a.m. (27th).	S.	5 a.m. (27th).	S.S.E.	43	10	7 p.m. (27th).	S.S.E.	17	6 a.m. (27th). 1 p.m. (27th).	S.S.E. S. by E.	47	—
	8 p.m. (27th).	S. by E.	—	—	—	—	1 a.m. (28th).	S.W.	5	11 p.m. (27th).	S. by E.	36	—
	2 a.m. (28th).	S.W. b.W.	3 a.m. (28th).	W.S.W.	45	4	1 p.m. (28th).	S.W.	11	5 a.m. (28th).	W. by S.	49	—
Aberdeen	3 p.m. (27th).	S. by E.	5 p.m. (27th).	S. by E.	40	1	8 p.m. (27th).	S.	5	5 p.m. (27th).	S. by E.	40	—
Glasgow	3 p.m. (27th).	S.	1 a.m. (28th).	S.W.byS.	40	1	4 a.m. (28th).	W.S.W.	13	1 a.m. (28th).	S.W.byS.	40	—
Alnwick Castle.	—	—	1 a.m. (28th).	S.S.W.	46	4	5 a.m. (28th).	W. by N.	4	2 a.m. (28th).	S.S.W.	52	—
Seaham	11 p.m. (27th).	S.	—	—	—	—	3 a.m. (28th).	S.	4	11 p.m. (27th).	S.	35	—
Stony-hurst.	5 p.m. (27th).	S. by E.	—	—	—	—	10 p.m. (27th).	S. by E.	5	7 p.m. (27th).	S. by E.	38	35 miles were again recorded at Midt. 27th.
Holyhead	9 p.m. (26th).	S. by E.	3 a.m. (27th).	S. by E.	41	4	5 a.m. (28th).	S.W.	32	5 p.m. (27th).	S. by E.	60	—
			8 a.m. (27th).	S. by E.	51	18							
Armagh	1 a.m. (27th).	S. by E.	—	—	—	—	5 a.m. (27th).	S.	4	2 a.m. (27th).	S.	32	—
	11 a.m. (27th).	S. by W.	—	—	—	—	1 p.m. (27th).	S.S.W.	2	11 a.m. (27th).	S. by W.	36	—
	3 p.m. (27th).	S. by W.	—	—	—	—	1 a.m. (28th).	W.S.W.	10	5 p.m. (27th).	S. by W.	39	—
Valencia	4 p.m. (25th).	S.S.E.	1 a.m. (26th).	S.S.E.	43	3	Midt. (27th).	W.S.W.	56	3 p.m. (27th).	S. by W.	64	—
			5 a.m. (26th).	S.S.E.	41	6							
			Noon (26th).	S.S.E.	40	1							
			7 p.m. (26th).	S. by E.	41	3							
			Midt. (26th).	S.	42	2							
			3 a.m. (27th).	S.	49	21							

No. 26. (Cyclonic System, No. LXXXII.)

Dec. 27-29, 1879.													
Sand-wick.	5 p.m. (28th).	S. by E.	7 p.m. (28th).	S.E.	41	1	8 p.m. (28th).	S.E.	3	7 p.m. (28th).	S.E.	41	—
	—	—	10 p.m. (28th).	N.W.b.W.	46	8	8 a.m. (29th).	W.	10	11 p.m. (28th).	W.N.W.	56	—
Aberdeen	7 p.m. (28th).	S.S.W.	8 p.m. (28th).	S.S.W.	51	4	1 a.m. (29th).	W.S.W.	6	10 p.m. (28th).	W. by S.	58	—
Glasgow	—	—	4 p.m. (28th).	S. by W.	51	6	Midt. (28th).	W.S.W.	8	7 p.m. (28th).	W.S.W.	58	—
Alnwick Castle.	—	—	6 p.m. (28th).	S.W. by S.	53	8	8 p.m. (29th).	W. by S.	26	7 p.m. (28th).	S.W.byW.	62	—
			6 p.m. (29th).	S.W.byW.	40	1							

(*continued*)

No. 26. (Cyclonic System, No. LXXXII.)—*continued.*

Stations.	Velocity 30-40 Miles per Hour.		Velocity Exceeding 40 Miles per Hour.				Velocity Fell below 30 Miles per Hour.		Total No. of Hours the Vel. above 30 Mls.	Maximum Velocity.			Remarks.
	Commenced.	Direction of Wind.	Commenced.	Direction of Wind.	Mean Vel.	Duration in Hours.	Ended.	Direction of Wind.		Hour.	Direction of Wind.	Velocity.	
Dec. 27-29, 1879.													
Seaham	—	—	7 p.m. (28th).	S.W.	41	1	9 p.m. (28th).	—	2	7 p.m. (28th).	S.W.	41	The vane was out of order at 9 p.m. 28th; the direction was probably S.W.
Stonyhurst.	8 p.m. (28th).	S.W.byW.	—	—	—	—	10 p.m. (28th).	W.S.W.	2	8 p.m. (28th).	SW. by W.	34	—
Holyhead	1 p.m. (28th).	S. by W.	2 p.m. (28th).	S.	43	5	9 p.m. (28th).	S.W. by S.	8	5 p.m. (28th).	S.S.W.	46	—
Armagh	2 p.m. (28th).	S.S.W.	3 p.m. (28th).	S.S.W.	41	2	7 p.m. (28th).	W.S.W.	5	4 p.m. (28th).	S.W. by S.	41	—
Valencia	9 a.m. (28th).	S.	10 a.m. (28th).	S.	52	6	11 p.m. (28th).	W.S.W.	14	11 a.m. (28th).	S.S.W.	59	—
Falmouth	11 a.m. (27th).	S.	11 p.m. (27th). 7 p.m. (28th).	S.S.W. S.W.	42 41	2 1	Midt. (28th).	W. by S.	37	11 p.m. (27th).	S.S.W.	42	—

No. 27. (Cyclonic System, No. LXXXIII.)

Dec. 29-30 1879.													
Sandwick.	2 p.m. (30th).	S.E. by S.	—	—	—	—	4 p.m. (30th).	S.W.byW.	2	2 p.m. (30th).	S.E. by S.	33	—
	9 p.m. (30th).	W.	10 p.m. (30th).	W. by N.	47	5	7 a.m. (31st).	W. by S.	10	Midt. (30th).	W.	52	—
Alnwick Castle.	9 p.m. (29th).	W. by S.	3 a.m. (30th). 7 a.m. (30th).	W.S.W. S.W.byW.	43 43	2 2	9 a.m. (30th).	S.W. by S.	12	4 a.m. (30th).	W.S.W.	44	—
Stonyhurst.	1 p.m. (30th).	W.S.W.	5 p.m. (30th).	W. by S.	41	2	10 p.m. (30th).	W. by S.	9	5 p.m. (30th).	W. by S.	41	—
Holyhead.	4 p.m. (29th).	S.W.byW.	—	—	—	—	4 a.m. (30th).	S.S.W.	12	5 p.m. (29th). 8 p.m. (29th). 9 p.m. (29th).	S.W.byW. W.by S. W.by S.	38	—
	5 a.m. (30th).	S.	6 a.m. (30th).	S. by E.	44	16	Midt. (30th).	W.S.W.	19	4 p.m. (30th). 6 & 7 p.m. (30th.)	W. by S. W.	48	—
Valencia.	11 a.m. (29th).	W. by S.	2 p.m. (29th).	W. by S.	41	1	6 p.m. (29th).	W.	7	2 p.m. (29th).	W. by S.	41	—
	11 p.m. (29th).	S.W. by W.	Midt. (29th). 5 a.m. (30th).	S.W. W. by S.	49 46	4 9	6 p.m. (30th).	W.N.W.	19	2 a.m. (30th).	S. by W.	57	—
Falmouth.	4 p.m. (29th).	W.	—	—	—	—	8 p m. (29th).	W.	4	4 & 7 p.m. (29th).	W.	35	—
	2 a.m. (30th).	S.W.	9 a.m. (30th).	S.W.	45	6	6 p.m. (30th.)	W. by N.	16	1 & 2 p.m. (30th).	W.	50	—
Yarmouth	8 p.m. (30th).	W.	—	—	—	—	2 a.m. (31st).	W.	6	10 p.m. (30th).	W.	35	—

TABLE OF ANTICYCLONIC SYSTEMS.—OCTOBER—DECEMBER 1879.

NATURE OF CHARACTERISTICS OBSERVED.	No. XIX. October 2-17.	No. XX. October 26—November 22.	No. XXI. November 24-30.	No. XXII. December 6-31.
Form	Somewhat elliptical, but varying a good deal.	Very irregular	Elliptical	Irregular.
Size	Large	Large	Large	Large.
Height	From small to moderate. Maximum readings 30·55 ins. on 8th and 9th.	Moderate. Maximum readings 30·75 ins. on November 20th.	Small. Maximum readings 30·65 ins. on the 25th.	Moderate. Maximum readings 30·85 ins. on the 23rd.
Where first Observed	Over the Peninsula	Over Sweden	To the northward of Scotland.	Over the British Isles.
Direction of Motion	Northwards, then westwards, and then southwards.	Very variable; first southwestwards, and finally northeastwards.	Westward or south-westwards	At first easterly, then nearly stationary or very irregular.
Rate of Motion	Very slow, and for many days stationary.	As a rule slow	Slow	Slow.
Regions passed over	France, the Netherlands, and the British Isles.	Scandinavia, Germany, and the British Isles.	Scandinavia and the British Isles.	The British Isles and Central and Southern Europe.
Termination	Apparently became dispersed over the Bay of Biscay.	Disappeared over Lapland	Disappeared to the westward of Ireland.	Did not finally disappear till the middle of January.
Accompanying Wind	Westerly, moderate or fresh; then a light variable wind, but Easterly over Channel and France. Later a Westerly wind blew over Scotland, followed by a Northerly wind generally.	Varied a great deal with the movement of the anti-cyclone; but first it Easterly, then Northerly, and then Westerly and South-westerly, and finally Easterly again, the force varying from light to strong.	Easterly, backing to North over the greater part of the United Kingdom; a gale in the Channel; light to moderate elsewhere.	Generally from between South and West, but varying with the movements of the anti-cyclone.
” **Weather**	Generally fine and dry, but with a good deal of fog towards the close of the period.	Generally dry; but a good deal of dull cloudy weather was experienced.	As a rule fine and bright, except in the east and north, in which districts heavy snow fell. Showers of snow or sleet fell occasionally over the greater part of the kingdom.	Generally dull and gloomy, but dry and very cold, till towards the close of the period, then squally and very unsettled.
REMARKS	During the first few days of this period pressure was high over the whole of central Europe; but subsequently areas of low pressure began to show themselves to the eastward, over Russia, and still later other low pressure systems travelled over the northern limits of our area, and caused the anticyclone to disperse and move away to the south-westward of our island.	Several depressions were observed on the outskirts of this anticyclone during the time that it lay within our area, and in consequence somewhat steep gradients and strong winds were at times experienced, while the anticyclone itself varied a good deal, both in position and in height.	The movement of the system towards the west was apparently caused by the advance in a southerly direction of an area of low pressure which had appeared over Scandinavia. Rather steep gradients with strong Easterly winds had previously existed over the Channel, owing to the low pressures reported from the Peninsula and the south of France.	This system maintained itself very persistently over central and western Europe till about the 28th, when the arrival of a deep depression in the north-west caused it to recede to the southward for a few days. It never passed quite beyond the area covered by our observations, however, and soon moving northwards again it continued till the middle of January.

NOTES to accompany the ANTICYCLONIC TABLES.

October 18th–25th.—During the first day or two of this interval the highest pressures were reported from the Peninsula and the Mediterranean, from whence they moved northwards to the Bay of Biscay. At the close of the 22nd they extended themselves eastwards, in an arm of relatively high readings which stretched across France to Germany. On the morning of the 24th pressure had become relatively high over the whole of central Europe; but an area of low readings appearing in the west the higher pressures became transferred, first to the north-eastward, and then in a more westerly direction to Sweden, where it was observed on the 26th as the first appearance of anticyclonic system No. XX.

December 1st–5th.—During the first three days of this interval the highest readings shifted from the neighbourhood of the west coast of Ireland to the north of Europe. On the 4th areas of low pressure were reported from both northern and southern Europe, and only a somewhat narrow strip of relatively high pressure stretched from the British Isles eastwards to central and eastern Europe; this however soon gave way, and on the 5th the highest readings were reported from the Bay of Biscay, with a second area over the northern half of Scandinavia.

SECTION III.

Remarks for October 1879.

(*Tables A. to C., October, with Monthly Wind and Weather Charts.*)

Wind.—The month began with a cyclonic wind circulation due to the existence of a large area of low pressure to the northward of the British Isles, and therefore Westerly winds were experienced in the south-west and Southerly winds over the remainder of the kingdom; these presently veered and moderate to strong Westerly winds became general during the first few days. On the 4th a retrograde movement set in, the wind backing at first to South-south-east over the south-western counties and then developing into a moderate Easterly breeze over the channel, while further north light anticyclonic airs, chiefly from South or South-east, blew over the greater part of the kingdom. In the extreme north, however, a Westerly wind continued to blow, and on the 9th this current extended itself southwards over Scotland, while on our east coast the direction became Northerly, and in the south-east of England, North-easterly. The next important change took place on the 13th when the Westerly current temporarily spread over the greater part of England, but after a few hours it veered again, and by the close of the 14th a fresh Northerly wind had become general. On the 16th another retrograde movement commenced, and in a few hours a strong South-westerly wind was blowing over Scotland and a moderate Westerly wind over southern England; the latter, however, quickly increasing in force, while the South-westerly wind in the north veered to North-west and North without abating in strength. For some days after this the direction of the wind was governed by a series of depressions which passed to the northward of Great Britain, and it was therefore upon the whole Westerly, backing at times to South-west with the approach of a new system, and then veering in its rear to North-west and even North; the force being as a rule moderate or fresh, but occasionally rising to a gale. On the 25th a few hours of light and variable airs were experienced, after which the wind backed to East, and from this time till the close of the month moderate to fresh Easterly winds were felt over the greater part of the United Kingdom. At the mouth of the Channel the wind frequently imcreased to the strength of a gale, but in the north of Scotland calms were frequent, and occasionally in the Shetlands and Orkneys light Westerly airs were felt. On the 31st this Westerly current freshened and spread southwards, and at the same time the Easterly wind over England commenced to back towards the north.

Dealing with the results for the whole area, as shown on the Monthly Wind Chart, we see that while in the Shetlands Easterly winds were scarcely felt at all, yet at the two most southern stations they were in excess of the winds from the opposite quarters; and that while over the greater part of England and over Ireland, as well as along the western littoral of Scotland, there was no marked predominance of winds from any one quarter, yet at the north-eastern stations Easterly winds were but little felt and the winds experienced were almost entirely Westerly.

Pressure.—All over the United Kingdom the mean pressure for the month was considerably above the average, a condition which had not existed before for some months. The values varied from 30·15 inches in the south-west of Ireland and the south of Devon, to 29·9 inches at the Shetland Islands, and the mean gradients therefore accord very well with the prevailing wind currents described above. The range of pressure was rather large at the northern stations and amounted to 1·7 inches at Aberdeen, while at Valencia, where it was least, it did not amount to an inch. The highest readings were recorded in connection with Anticyclonic System No. XIX., the centre of which covered the greater portion of the United Kingdom from about the 7th to the 13th; in the north the maxima were registered on the 8th, but at Kew not until the 12th; everywhere the barometer rose to between 30·5 and 30·6 inches. The mercury reached its lowest point all over the country during the morning of the 20th, when depression No. LXXII. was travelling past our northern coast; at Aberdeen it fell to 28·86 inches but at Kew to only 29·37 inches, while at Valencia it did not reach 29·6 inches.

Movements of the Depressions.—Only a few cyclonic disturbances were experienced during the month, and they for the most part followed an easterly track, but at a considerable distance to the northward of Great Britain. Anticyclonic conditions prevailed during the first half of the month and again during the last week.

Temperature.—The mean temperature for the month (corrected for height above sea level) ranged from nearly 55° at Scilly to a little above 45° in the north of Scotland, and was therefore normal all over the United Kingdom. The highest temperatures were most generally recorded between the 4th and 7th when the western edge of an anticyclonic area lay over Great Britain and caused Southerly or South-easterly winds to prevail; the thermometer rose to 70° at Caermarthen and to 67° and 68° at a few other stations, although as a rule the maxima ranged from 60° to 65°. The minima were registered at the majority of stations on the 16th, under almost exactly opposite conditions of pressure distribution, which brought with them a cold Northerly current; at some stations on the north-east coast, however, slightly lower readings were recorded later on the 26th. At Cheltenham the thermometer fell to 24·5°, but as a rule 30° was the lowest point reached; at some stations on the western coast, however, the thermometer did not fall below 40°, and at Scilly 46° was the minimum of the month. The range of temperature amounted as a rule to a little more than 30°.

Vapour Tension.—The mean tension of vapour averaged about three-tenths of an inch over the greater part of the United Kingdom, but along the southern and south-western coasts the mean values were higher, rising at Scilly to ·37 inch; while towards the north they decreased, falling to ·24 inch at Nairn and Aberdeen. *Relative Humidity* was fairly uniform over the whole of the British Islands, the mean values nowhere differing very much from 90 °/₀ except in one or two isolated instances, as at Nairn where the mean was as low as 83 °/₀.

Rainfall.—The fall of rain was very much below the average all over the United Kingdom, the monthly totals at several stations being only about one-third or even one-fourth of the average amount. There were no very heavy daily falls except at Dartmoor and Laudale, at both which places, however, the normal fall is exceptionally large.

TABLE A., OCTOBER.—SHOWING the MEAN and EXTREME PRESSURES and TEMPERATURES recorded at each of the SEVEN SELF-RECORDING OBSERVATORIES of the METEOROLOGICAL OFFICE during the Month of OCTOBER 1879; together with the MONTHLY VAPOUR TENSION, the RELATIVE HUMIDITY, and TOTAL RAINFALL.

NAMES OF OBSERVATORIES.	PRESSURE at 32° F. and the Mean Sea Level (In English Inches).						TEMPERATURE In the Shade (In Degrees Fahrenheit).						HYGROMETRIC VALUES.		RAINFALL (In English Inches).
	Mean for the Month.	Extremes.				Range.	Mean for the Month.	Extremes.				Range.	Tension of Vapour (In English Inches).	Relative Humidity (Saturation = 100).	
		Minimum.		Maximum.				Minimum.		Maximum.					
		Reading.	Date.	Reading.	Date.			Reading.	Date.	Reading.	Date.				
	ins.	ins.	D. H.	ins.	D. H.	ins.	°	°	D. H.	°	D. H.	°	in.	°/₀	ins.
Valencia - -	30·152	29·607	20th, 4 a.m.	30·547	9th, 10 a.m.	0·940	51·1	37·4	26th, 7 a.m.	63·6	6th, 3 p.m.	26·2	·325	86	2·209
Armagh - -	·136	29·293	19th, Midt.	·586	8th, 11 a.m.	1·293	47·3	32·7	26th, 2 a.m. 3 a.m.	58·4	5th, Noon.	25·7	·294	91	1·390
Glasgow - -	·067	28·986	20th, 1 a.m. 2 a.m.	·562	8th, 10 a.m.	1·576	45·9	29·4	28th, 7 a.m.	58·9	6th, 3 p.m.	29·5	·268	88	2·400
Aberdeen -	·032	28·860	20th, 2 a.m.	·562	8th, 8 a.m. 9 a.m. 10 a.m.	1·702	45·4	30·0	27th, 7 a.m.	60·4	10th, 3 p.m.	30·4	·251	84	1·120
Falmouth - -	·143	29·580	20th, 7 a.m.	·513	11th, 10 a.m.	0·933	52·9	37·3	16th, 2 a.m.	60·4	7th, 4 p.m.	23·1	·333	83	2·260
Stonyhurst - -	·111	·198	20th, 4 a.m. 5 a.m.	·566	8th, Midt.	1·368	47·4	30·2	16th, 4 a.m.	60·5	5th, 3 p.m.	30·3	·284	87	4·044
Kew - -	30·132	29·373	20th, 6 a.m.	30·569	12th, 10 a.m.	1·196	49·4	32·9	26th, 4 a.m.	64·4	4th, 3 p.m.	31·5	·305	87	0·690

TABLE B., October.—Giving a Summary of the Meteorological Observations made at The Values are not

(The Stations are grouped in Districts, and then arranged in order of

Names of Districts.	Names of Stations.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 9 a.m. and 9 p.m.	Air Temperature.									
			At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Means of			Absolute Extremes.			
						Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.
		ins.	°	°	°	°	°	°	°		°	
0. SCOTLAND, N. -	Orkneys (Sandwick Manse) -	29·963	46·9	45·4	46·2	43·3	50·6	47·0	34·8	16th	54·9	5th
1. SCOTLAND, E. -	Glenalmond - - -	30·076	44·8	42·1	43·5	35·6	53·0	44·3	28·4	26th	65·6	7th
2. ENGLAND, N.E. -	Seaham - - - -	30·074	48·9	46·5	47·7	41·1	54·2	47·7	30·6	26th	65·7	6th, 9th
	Durham* - - -	30·077	49·6	43·7	46·7	38·4	55·6	47·0	28·0	26th	68·1	9th
	Hull - - - -	30·114	48·4	46·5	47·5	41·9	55·8	48·9	32·5	26th	68·7	11th
	Kelstern ℜ - - -	30·123	47·4	44·4	45·9	40·5	53·6	47·1	31·9	22nd	61·7	4th
3. ENGLAND, E. -	Hillington ℜ - - -	30·114	49·6	46·3	48·0	41·1	54·7	47·9	29·1	22nd	66·4	6th
	Audley End ℜ (Saffron Walden).†	—	—	—	—	—	—	—	—	—	—	—
	Chigwell Row - - -	30·163	49·3	48·5	48·9	43·9	54·6	49·3	33·0	16th	63·0	4th
4. MIDLAND COUNTIES.	Wakefield ℜ - - -	30·117	47·3	46·4	46·9	41·2	54·5	47·9	30·0	26th	65·8	5th
	Buxton ℜ - - -	30·142	45·6	44·9	45·3	39·5	51·7	45·6	29·8	16th	61·9	5th
	Cheadle ℜ - - -	30·142	46·2	45·8	46·0	41·2	52·7	47·0	31·0	16th	62·0	5th
	Leicester - - -	30·124	49·3	47·7	48·5	43·1	54·9	49·0	33·0	16th	64·0	6th
	Uppingham - - -	30·125	47·5	45·8	46·7	42·1	53·6	47·9	31·5	16th	63·6	6th
	Oscott - - - -	30·136	47·5	46·6	47·1	42·6	54·1	48·4	31·1	16th	64·9	5th
	Churchstoke ℜ - -	30·158	47·0	46·6	46·8	41·5	54·3	47·9	26·8	16th	63·1	23rd
	Cheltenham ℜ - -	30·141	49·3	47·0	48·2	41·9	54·5	48·2	24·5	16th	65·0	4th
5. ENGLAND, S. -	Marlborough ℜ - -	30·160	48·0	46·1	47·1	41·8	55·8	48·8	28·2	16th	66·9	4th
	Strathfield Turgiss ℜ -	30·149	49·2	46·9	48·1	41·4	56·2	48·8	29·0	26th	67·2	4th, 6th
	Ramsgate ℜ - - -	30·139	51·4	50·9	51·2	45·3	56·5	50·9	35·1	17th	65·4	7th
	Folkestone - - -	30·135	51·2	49·6	50·4	45·0	56·1	50·6	35·2	16th	63·8	4th
	Southampton - -	30·142	50·2	48·6	49·4	44·0	56·5	50·3	31·3	16th	67·1	6th, 7th
	Hastings - - -	30·135	50·5	49·9	50·2	45·5	54·9	50·2	34·2	16th	62·4	4th
6. SCOTLAND, W. -	Laudale - - -	—	—	—	—	41·6	54·5	48·1	32·4	27th	59·2	5th
7. ENGLAND, N.W.	Douglas (Isle of Man) -	30·108	49·5	47·2	48·4	42·8	53·5	48·2	30·3	26th	60·0	23rd
	Llandudno ℜ - - -	30·131	50·1	49·7	49·9	46·1	54·2	50·2	39·8	29th	61·3	6th
8. ENGLAND, S.W. -	St. David's (Pembroke) -	30·143	51·6	49·9	50·8	46·6	55·4	51·0	39·3	15th	65·9	7th
	Caermarthen ℜ - -	30·139	50·2	48·7	49·5	44·1	57·8	51·0	30·1	16th	70·2	7th
	Dartmoor ℜ - - -	30·138	46·7	45·0	45·9	41·4	51·1	46·3	27·9	16th	59·2	4th
	Babbacombe ℜ - -	30·146	51·7	50·0	50·9	46·2	56·6	51·4	32·0	16th	64·8	4th
9. IRELAND, N. -	Londonderry - - -	30·127	47·0	46·8	46·9	42·5	52·9	47·7	30·6	26th	62·5	6th
	Brookeborough - -	30·102	45·8	46·4	46·1	41·0	52·9	47·0	31·8	15th	65·5	7th
	Markree Castle - -	30·132	48·7	46·5	47·6	41·5	54·6	48·1	29·5	15th	68·2	8th
10. IRELAND, S. -	Dublin - - - -	30·148	49·7	49·2	49·5	45·6	53·8	49·7	36·1	16th	60·3	5th
	Parsonstown - -	30·163	47·8	47·5	47·7	43·0	55·4	49·2	28·8	26th	64·6	6th
CHANNEL - -	Jersey (St. Aubin's) - -	30·158	55·0	53·1	54·1	49·7	58·1	53·9	40·1	16th	64·9	4th

Note.—The stations marked thus ℜ are in connection with the Royal Meteorological Society.

* At Durham the observations were taken at 10 a.m. and 10 p.m. each day.

† Observations discontinued.

STATIONS of the SECOND ORDER in the BRITISH ISLANDS, during the Month of OCTOBER 1879.
corrected for Diurnal Range.
Latitude, beginning in each case with the Station lying furthest North.)

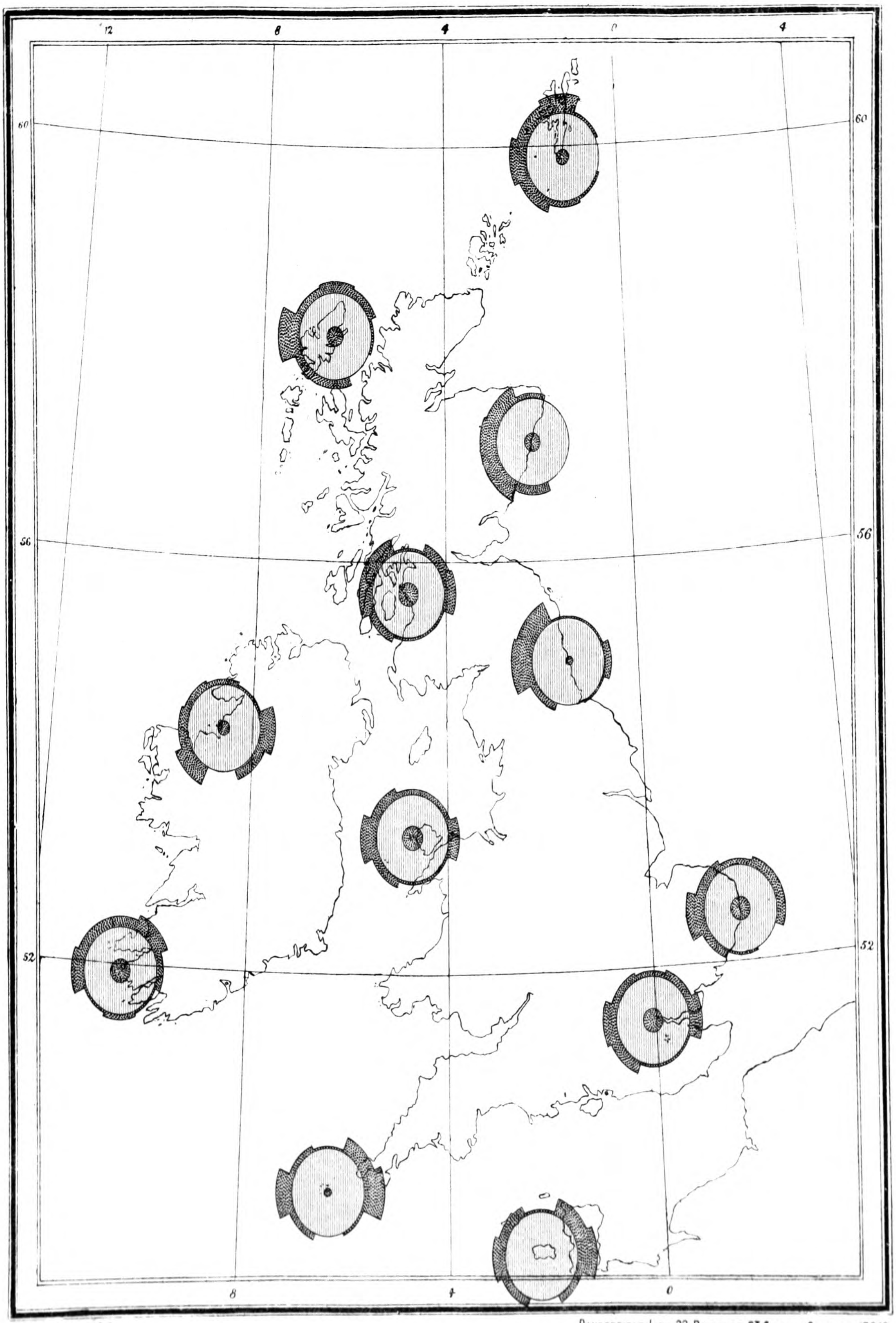
TENSION OF VAPOUR.			RELATIVE HUMIDITY.			AMOUNT OF CLOUD (0 to 10).			RAINFALL.			WEATHER. No. of Days of							WIND. No. of Observations of								
At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
in	in.	in.	%	%	%				ins.	ins.																	
0·278	0·262	0·270	88	87	88	7·7	6·5	7·1	3·400	0·570	18th	23	1	0	0	3	12	6	7	3	0	1	2	10	22	8	9
·259	·247	·253	85	90	88	5·8	5·1	5·5	1·204	·254	18th	12	0	0	0	2	5	1	4	1	1	1	2	9	18	8	18
·299	·279	·289	86	88	87	5·3	3·7	4·5	0·834	·320	14th	13	0	1	0	8	5	0	1	3	2	1	4	9	13	8	21
·312	·269	·291	87	93	90	5·3	4·6	5·0	0·682	·308	14th	10	0	0	0	9	10	0	3	4	2	0	9	12	14	11	7
·300	·288	·294	89	91	90	6·3	4·2	5·3	0·780	·200	14th	12	0	0	0	6	8	0	5	7	3	0	0	7	13	4	23
·309	·279	·294	93	95	94	7·0	4·8	5·9	1·230	·310	1st	11	0	0	0	4	9	0	8	10	3	2	3	12	12	10	2
·325	·300	·313	91	94	92	7·5	6·8	7·2	1·207	·260	14th	14	0	0	1	2	16	0	8	6	4	7	1	12	11	11	2
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
·308	·303	·306	88	89	89	8·5	6·7	7·6	0·710	·240	19th	13	0	0	0	1	16	0	3	6	9	2	1	11	5	7	18
·299	·293	·296	91	92	91	7·5	6·6	7·1	1·020	·210	14th	12	0	0	0	1	11	0	5	3	4	3	3	11	18	14	1
·289	·279	·284	93	93	93	8·1	6·3	7·2	2·804	·550	3rd	13	0	0	1	1	13	0	5	6	11	6	0	3	5	23	3
·294	·287	·291	94	93	94	7·7	7·3	7·5	1·270	·330	2nd	13	0	2	2	1	17	6	3	3	12	5	1	12	6	17	3
·306	·297	·302	88	90	89	8·6	6·9	7·8	0·910	·300	2nd	15	0	0	0	2	17	0	5	10	7	5	2	12	7	3	11
·302	·236	·294	91	92	92	7·8	6·5	7·2	0·559	·134	2nd	15	0	0	0	2	16	0	7	5	7	1	2	7	19	4	10
·304	·296	·300	91	92	92	8·6	8·2	8·4	0·880	·270	24th	11	0	0	0	0	23	2	4	14	5	1	3	9	9	10	7
·291	·290	·291	89	91	90	8·3	6·5	7·4	1·162	·233	19th	11	0	0	2	0	12	0	3	8	3	3	1	9	14	6	15
·311	·299	·305	87	92	90	8·5	7·4	8·0	1·120	·290	24th	13	0	0	0	1	18	0	3	3	7	7	5	6	5	7	19
·301	·292	·297	89	93	91	7·8	6·5	7·2	1·000	·172	19th	14	0	0	0	2	16	0	2	10	6	0	0	8	6	3	27
·314	·298	·306	89	91	90	8·5	6·6	7·6	0·834	·195	24th	10	0	0	0	2	20	0	1	16	5	4	1	10	8	12	5
—	—	—	—	—	—	7·1	7·1	7·1	1·040	·240	25th	12	0	1	0	3	14	0	4	8	5	1	0	11	9	2	22
·333	·328	·331	88	91	89	6·8	6·8	6·8	0·727	·180	18th	11	0	0	1	4	16	0	6	11	13	2	1	5	19	3	2
·330	·318	·324	90	91	90	7·7	6·0	6·9	0·821	·197	24th	13	0	0	0	6	18	0	4	17	9	1	0	13	3	12	3
·329	·327	·328	88	90	89	6·2	5·6	5·9	1·105	·290	24th	19	0	0	1	8	13	1	5	25	2	1	4	6	9	7	3
—	—	—	—	—	—	—	—	—	4·210	1·040	19th	19	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
·323	·302	·313	90	92	91	7·7	5·9	6·8	1·456	·475	18th	16	0	0	1	1	13	2	3	4	11	0	0	4	10	15	15
·318	·308	·313	87	86	86	7·1	6·6	6·9	1·630	·328	24th	11	0	1	1	6	17	2	4	2	11	6	5	3	22	9	0
·330	·314	·322	86	87	86	7·5	6·2	6·9	1·793	·586	25th	12	0	1	0	2	14	0	4	14	12	4	0	8	10	8	2
·322	·320	·321	88	92	90	7·1	6·2	6·7	1·840	·320	24th	16	0	2	0	4	13	0	5	2	21	1	0	6	12	5	10
·307	·292	·300	95	96	96	8·0	8·1	8·1	5·490	1·500	20th	14	0	1	0	1	21	1	0	9	21	4	0	3	13	10	2
·336	·325	·331	87	89	88	7·5	6·9	7·2	0·800	·200	24th	11	0	0	0	2	17	1	3	15	15	2	0	8	15	4	0
·298	·301	·300	91	93	92	8·5	6·6	7·6	2·360	·480	3rd	21	0	2	0	1	17	0	2	2	6	5	4	11	9	6	17
·286	·294	·290	93	93	93	9·2	6·8	8·0	2·408	·412	18th, 19th	14	0	0	1	1	20	3	3	9	1	1	0	9	7	8	24
·311	·297	·304	90	92	91	7·1	6·7	6·9	2·372	·350	19th	22	0	1	0	6	18	0	3	2	5	4	7	5	6	9	21
·317	·314	·316	88	89	88	8·0	6·6	7·3	1·320	·594	25th	14	0	2	2	2	15	0	2	8	10	4	1	2	21	8	6
·308	·308	·308	92	93	92	8·1	7·3	7·7	1·235	·460	18th	18	0	0	0	3	19	0	5	7	4	6	0	7	13	5	9
·346	·344	·345	80	84	82	6·9	5·7	6·3	1·379	·240	19th	12	0	0		7	14	1	5	10	22	3	0	5	10	5	2

TABLE C., OCTOBER.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at TELEGRAPHIC REPORTING STATIONS in the BRITISH ISLANDS during the Month of OCTOBER 1879. Observations are made at 8 a.m. daily.

(The Stations are grouped in Districts, and then arranged in order of Latitude, beginning in each case with the Station lying furthest North.)

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 8 a.m.	AIR TEMPERATURE.								TENSION OF VAPOUR.	RELATIVE HUMIDITY.	AMOUNT OF CLOUD (0 to 10).	RAINFALL.			WEATHER. No. of Days of							WIND. No. of Observations of								
				Means of			Absolute Extremes.																									
			At 8 a.m.	Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.				Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
		ins.	°	°	°	°	°		°		in.	%		ins.	ins.																	
0. SCOTLAND N.	Sumburgh Head	29·902	45·8	41·8	50·0	45·9	34	15th, 22nd	54	6th	0·278	91	7·4	4·48	0·78	18th	26	0	0	0	3	15	4	7	1	0	1	2	5	8	5	2
	Wick	29·965	45·5	38·0	52·2	45·1	27	27th	61	5th	·267	88	8·0	2·28	0·75	25th	14	0	0	0	2	19	2	1	0	0	0	3	6	12	7	2
	Stornoway	29·971	45·8	39·8	50·3	45·1	32	5th	55	5th, 6th, 8th, 9th, 10th.	·280	91	6·1	2·72	0·46	18th	18	0	0	0	5	12	2	4	3	1	0	3	3	11	3	3
1. SCOTLAND, E.	Nairn	30·009	43·8	40·1	51·9	46·0	29	27th, 28th	61	5th	·238	83	4·8	1·10	0·30	13th	14	0	0	0	10	6	0	1	1	0	0	1	8	8	3	9
	Aberdeen	30·008	43·3	38·2	54·4	46·3	30	26th, 27th 28th.	64	10th	·244	87	4·1	1·16	0·41	18th	14	1	2	0	15	7	3	2	0	0	0	3	8	8	7	3
	Leith	30·049	44·8	39·6	54·6	47·1	29	26th	64	6th	·267	90	5·9	0·81	0·20	18th	14	0	0	0	6	9	0	0	1	2	0	1	7	18	1	1
2. ENGLAND, N.E	Shields	30·071	46·0	39·4	54·9	47·2	31	15th	63	5th	·280	91	5·5	0·82	0·26	14th	17	0	0	0	12	13	5	1	1	3	1	0	3	11	10	1
	York	30·104	45·1	39·0	55·7	47·4	30	26th	65	5th, 6th	·270	90	6·5	0·60	0·28	14th	13	0	0	0	9	15	0	5	2	3	2	7	2	6	4	0
	Spurn Head	30·078	48·8	44·7	53·7	49·2	40	15th, 16th 17th.	60	1st, 6th	·298	86	6·9	1·08	0·26	15th	12	0	2	0	5	13	2	4	3	0	3	3	11	5	2	0
3. ENGLAND, E.	Yarmouth	30·100	48·9	44·7	54·1	49·4	36	22nd	62	1st, 4th, 19th.	·313	91	6·2	1·65	0·32	24th	16	0	1	0	7	12	0	2	4	4	0	1	3	9	4	4
	Cambridge	30·126	47·0	41·3	56·4	48·9	31	26th	66	1st	·301	94	7·6	0·70	0·20	24th	11	0	0	0	6	20	0	4	4	3	2	0	7	7	4	0
4. MIDLAND COUNTIES.	Nottingham	30·127	47·4	41·0	55·6	48·3	31	16th	68	5th	·300	92	7·7	0·97	0·28	2nd	15	0	0	0	5	18	0	6	2	0	2	4	3	2	4	8
	Oxford	30·138	47·5	43·3	54·2	48·8	33	16th, 26th	65	4th	·304	94	8·5	0·89	0·25	2nd	15	1	0	0	3	24	0	2	2	7	0	2	2	8	3	5
5. ENGLAND, S.	London	30·132	48·7	43·8	56·1	50·0	35	16th, 17th 26th.	67	6th	·306	89	8·1	0·46	0·17	24th	9	0	0	0	4	22	0	2	3	6	1	1	4	6	3	5
	Dover	30·126	50·3	47·3	55·7	51·5	38	16th	63	7th	·316	87	6·0	1·04	0·38	18th	12	0	0	0	9	13	1	3	5	5	2	0	3	9	4	0
	Hurst Castle	30·121	49·6	46·5	55·1	50·8	33	16th	63	5th	·341	96	5·8	0·80	0·26	24th	9	0	0	0	9	9	1	5	5	7	2	0	2	6	4	0
6. SCOTLAND, W.	Ardrossan	30·066	46·1	41·9	52·8	47·4	31	15th, 16th	60	5th	·275	89	7·9	2·15	0·60	23rd	13	0	0	0	5	21	5	1	4	5	1	1	3	6	6	4
7. ENGLAND, N.W.	Liverpool	30·110	47·8	44·6	53·5	49·1	37	16th, 29th 30th.	61	5th	·302	91	8·2	1·16	0·22	24th	13	0	0	0	1	14	3	4	4	5	5	1	3	7	2	0
	Holyhead	30·113	50·4	47·8	55·0	51·4	43	26th	62	5th	·323	88	8·1	1·46	0·46	18th	15	0	0	0	4	21	2	2	2	5	1	1	3	8	4	5
8. ENGLAND, S.W.	Pembroke	30·121	50·9	48·1	55·1	51·6	42	15th, 16th	64	7th	·332	89	7·2	1·40	0·33	24th	13	0	0	0	4	16	6	2	6	7	3	0	3	4	6	0
	Prawle Point	30·153	51·4	47·8	56·5	52·2	34	16th	63	4th	·353	93	7·6	1·32	0·42	19th	13	0	0	0	1	11	2	3	8	6	1	0	4	4	5	0
9. IRELAND, N.	Donaghadee	30·113	47·7	43·7	52·8	48·3	35	26th	58	4th, 23rd	·308	94	6·7	1·13	0·29	23rd	12	0	0	0	5	10	0	3	3	4	1	1	3	12	4	0
	Mullaghmore	30·097	48·3	45·0	54·0	49·5	39	16th	64	6th	·306	91	7·5	3·59	0·55	2nd, 3rd	20	0	2	0	5	15	5	2	1	7	4	0	8	4	3	2
10. IRELAND, S.	Kingstown	30·128	49·5	45·4	55·1	50·3	35	15th	62	4th, 6th	·308	87	7·6	1·26	0·48	25th	20	0	0	0	1	13	5	0	1	5	1	2	2	12	6	2
	Valencia	30·152	50·4	46·1	56·8	51·5	36	26th	65	6th	·318	87	6·8	2·12	0·32	4th	16	0	0	0	5	14	1	4	6	2	1	2	1	6	4	5
	Roche's Point	30·139	50·8	46·3	55·9	51·1	38	27th	62	23rd	·333	89	6·8	0·97	0·38	18th	6	0	0	0	6	11	0	3	4	8	1	1	0	8	6	0
CHANNEL ISLANDS	Scilly	30·121	54·5	51·8	57·1	54·5	46	16th, 26th	62	3rd	·373	88	9·0	1·50	0·57	26th	15	0	0	0	1	23	8	1	6	10	1	0	2	8	2	1
	Jersey	30·102	53·2	49·9	57·3	53·6	41	17th	64	5th, 6th, 7th.	·349	86	6·3	1·30	0·23	20th	12	0	0	0	8	12	5	1	6	9	2	0	3	6	4	0

MONTHLY WIND CHART FOR OCTOBER 1879.

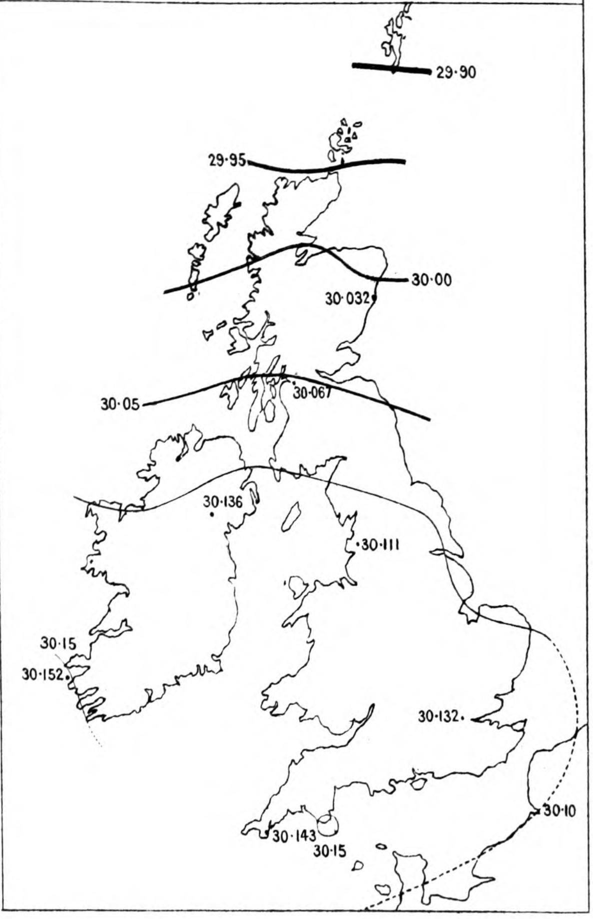

12
8
4
0
4
60
60
56
56
52
52
8
4
0

To face p. 134.

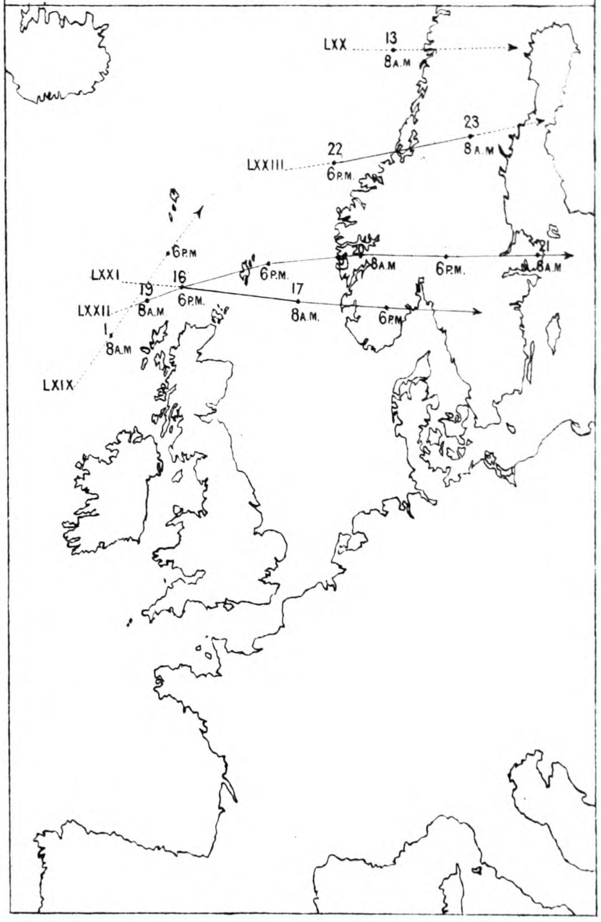
DANGERFIELD, LITH. 22, BEDFORD ST. COVENT GARDEN 17640

MONTHLY WEATHER CHART. OCTOBER, 1879.

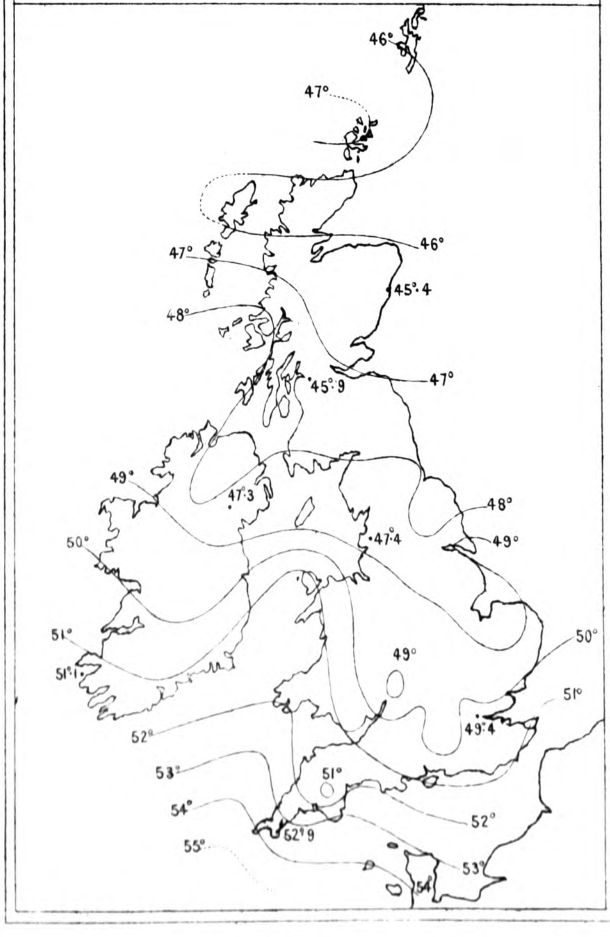
1. DISTRIBUTION OF MEAN PRESSURE


29·90
29·95
30·00
30·032
30·05
30·067
30·136
30·111
30·15
30·152
30·132
30·10
30·143
30·15

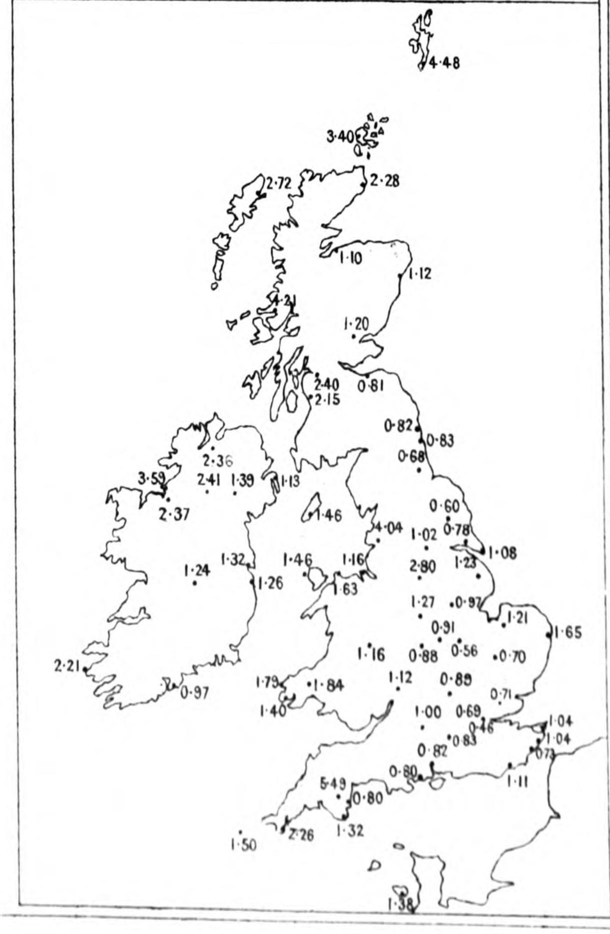
2. MOVEMENTS OF DEPRESSIONS.


LXX
13
8A.M
23
8A.M
22
6P.M.
LXXIII
6P.M
LXXI
19
16
6P.M.
6P.M.
20
8A.M
6P.M.
21
8A.M
LXXII
8A.M
6P.M.
17
8A.M.
6P.M.
1
8A.M
LXIX

3. DISTRIBUTION OF MEAN TEMPERATURE


46°
47°
46°
47°
45°.4
48°
47°
45°.9
49°
47°.3
48°
47°.4
49°
50°
51°
51°.1
49°
50°
51°
52°
49°.4
53°
51°
54°
52°.9
52°
55°
53°
54°

4. RAINFALL


4·48
3·40
2·72
2·28
1·10
1·12
4·21
1·20
2·40
2·15
0·81
0·82
0·83
0·68
2·36
3·59
2·41
1·39
1·13
2·37
1·46
4·04
0·60
0·78
1·02
1·08
1·32
1·46
1·16
2·80
1·23
1·24
1·26
1·63
1·27
0·97
1·21
1·65
0·91
1·16
0·88
0·56
0·70
2·21
1·79
1·84
1·12
0·89
0·71
0·97
1·40
1·00
0·69
0·46
1·04
1·04
0·83
0·82
0·73
0·80
1·11
5·49
0·80
2·26
1·32
1·50
1·38

To follow Wind Chart for October.

Dangerfield Lith. 22, Bedford St Covent Garden. 17640

REMARKS FOR NOVEMBER 1879.

(*Tables A. to C., with Monthly Wind and Weather Charts.*)

Wind.—During the opening days of the month a Northerly wind, which in places attained occasionally considerable strength, predominated over the British Isles, owing to the existence of a large area of high pressure just beyond our western coasts. On the 4th a retrograde movement began, and North-westerly or Westerly winds were experienced till the 8th, when the direction backed still further to South-west or South. This current did not, however, continue for many hours, and at the close of the 9th a sudden shift to the Northward took place, and a light Northerly air once more prevailed for a little while. On the 11th it again backed to West, and for a few hours rose to the force of a gale, after which it veered again to its former direction. The next important change began on the 14th, when a Southerly current began to be felt in the west, from whence it extended itself gradually eastward over Great Britain, and then veered once more to West; this, however, did not last long, and on the 19th the wind became light and variable, and then developed into an Easterly breeze which appeared first in the Channel and thence spread northwards, and at the same time rose to the force of a gale on the east coast of England. The Easterly current was broken up on the 21st by the arrival of a shallow depression over the Channel, round which the wind circulated, while it backed to North at the western stations; after this the direction became rather variable for a day or two, till on the 24th the Easterly current became re-established and soon freshened generally, while at the mouth of the Channel it increased to a gale. At the close of the 26th it backed to North over the greater part of the kingdom, and during the remainder of the month this was the most prevalent direction; but in the south-west of England the Easterly wind continued throughout, and for several hours blew with considerable force.

From the monthly wind chart it will be seen that polar winds largely predominated all over the British Isles, the largest per-centages falling, as a rule, between North-west and North-east. In the south-west the absence of South-westerly winds was most conspicuous, but Southerly winds were everywhere but little experienced.

Pressure.—The mean pressure for the month was abnormal both in amount and distribution. The highest mean shown on the Monthly Chart was 30·315 inches at Valencia, and the lowest 30·112 inches at Sumburgh Head, both amounts being about four-tenths of an inch above the average for the respective places, while on the east coast of England, where the difference from the normal was least, it still amounted to over a quarter of an inch. The range of pressure was largest at the northern stations, amounting to an inch and a quarter at Aberdeen while it only reached nine-tenths of an inch in the south of England, and only three-quarters of an inch at Valencia. Except in the south-west, the lowest readings were recorded at the close of the 11th, in connexion with depression No. LXXVII., when the barometer fell to 29·32 inches at Aberdeen. The highest reading recorded was 30·741 inches at Valencia on the evening of the 6th, within a few hours of which time the maxima were registered at all the observatories except Aberdeen, where the highest reading of the month, 30·575 inches, was not recorded till the 25th.

Movements of the Depressions.—With one exception, the tracks of all the cyclonic disturbances experienced this month lay to the northward of the British Isles, where they travelled in an easterly or south-easterly direction towards Scandinavia. The exception was depression No. LXXVIII., a shallow system which first appeared over the Channel and travelled from thence in a northerly direction over Great Britain. Anticyclonic conditions prevailed over our Islands during the greater part of the month.

Temperature.—Over the northern half of the kingdom the mean temperature was nearly normal, but over the southern half it was low, the means ranging from 2 to 3 degrees below the average for the month. At nearly every station the maximum reading was recorded on the 17th or 18th, with a Westerly wind; the minima, however, occurred very irregularly, the most general dates being about the 14th, the 22nd, and 30th. At Prawle Point 62° was recorded and in two instances, Caermarthen and Babbacombe, the thermometer rose to 60°, but generally the maxima were 3 or 4 degrees lower than that point. Some very low minima were recorded, the lowest being 12° at Buxton on the 22nd, but the mercury fell to 17° at Cheltenham, Strathfield Turgiss, and Nottingham. The range of temperature amounted to 40° at Buxton and to nearly as much at a few other inland stations; as a rule, however, it did not greatly exceed 30°, and at many coast stations was several degrees less than that.

Vapour Tension.—The tension of vapour was least over the central and eastern portions of Great Britain, where the values varied from ·20 inch to ·22 inch; on the western coast of England, and over Ireland, the values were ·02 or ·03 inch higher, while the highest mean value reported was ·28 inch at Scilly. *Relative Humidity* was as high as 95 at Cambridge, and as low as 79 at Glenalmond. Speaking generally it was highest over south-east England and the Midland districts, and over central Ireland, and least at the stations on the western coast of England and southern Ireland.

Rainfall.—The rainfall was slight all over the United Kingdom, the defect from the average being especially marked at some of the stations on the south-western coasts where the fall is usually heaviest. The largest totals reported were from the Durham Coast, and from the Orkneys; at the former the fall amounted to a little less than 3½ inches, and at the latter to 3·6 inches. At Valencia only eight-tenths of an inch fell throughout the month.

TABLE A., NOVEMBER.—SHOWING the MEAN and EXTREME PRESSURES and TEMPERATURES recorded at each of the SEVEN SELF-RECORDING OBSERVATORIES of the METEOROLOGICAL OFFICE during the Month of NOVEMBER 1879, together with the MONTHLY VAPOUR TENSION, the RELATIVE HUMIDITY, and TOTAL RAINFALL.

NAMES OF OBSERVATORIES.	PRESSURE at 32° F. and the Mean Sea Level (In English Inches).						TEMPERATURE In the Shade (In Degrees Fahrenheit).						HYGRO-METRIC VALUES.		RAIN-FALL (In English Inches).
	Mean for the Month.	Extremes.				Range.	Mean for the Month.	Extremes.				Range.	Tension of Vapour (In English Inches).	Relative Humidity (Saturation = 100).	
		Minimum.		Maximum.				Minimum.		Maximum.					
		Reading.	Date.	Reading.	Date.			Reading.	Date.	Reading.	Date.				
Valencia - -	ins. 30·309	ins. 29·965	D. H. 23rd, 3 p.m.	ins. 30·741	D. H. 6th, 8 p.m.	ins. 0·776	° 46·5	° 35·2	D. H. 2nd, 8 a.m.	° 56·6	D. H. 19th, 1 p.m.	° 21·4	in. ·253	°/o 81	ins. 0·852
Armagh - -	·310	·758	11th, 5 p.m.	·672	7th, 11 a.m.	0·914	42·3	29·0	30th, 8 p.m. Midt.	55·6	18th, 2 p.m.	26·6	·232	87	1·322
Glasgow - -	·240	·437	11th, 7 p.m.	·553	7th, 11 a.m.	1·116	41·0	25·7	14th, 9 a.m.	55·3	18th, 2 p.m.	29·6	·208	81	1·397
Aberdeen - -	·201	·323	11th, 9 p.m.	·575	25th, 6 p.m.	1·252	41·2	26·5	30th, 7 p.m.	57·1	17th, 2 p.m.	30·6	·206	80	2·950
Falmouth - -	·265	·807	21st, 5 p.m.	·702	6th, 11 a.m.	0·895	44·3	31·0	21st, 2 a.m.	55·0	19th, 11 a.m.	24·0	·225	77	2·565
Stonyhurst -	·239	·582	11th, 11 p.m.	·594	7th, 11 a.m.	1·012	39·7	26·5	14th, 5 a.m. 7 a.m.	53·8	18th, 2 p.m.	27·3	·199	81	1·304
Kew - -	30·221	29·748	12th, 1 a.m.	30·642	7th, Midt. 8th, 1 a.m.	0·894	38·8	21·9*	16th, 7 a.m.	54·9	18th, 2 p.m.	33·0	·201	85	0·765

* Somewhat doubtful, trace faint.

TABLE B., NOVEMBER.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at
The values are not

(The Stations are grouped in Districts, and then arranged in order of

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 9 a.m. and 9 p.m.	AIR TEMPERATURE.									
			At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Means of			Absolute Extremes.			
						Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.
		ins.	°	°	°	°	°	°	°		°	
0. SCOTLAND, N.	Sandwick Manse (Orkneys)	30·165	42·3	42·2	42·3	39·2	45·9	42·6	28·8	30th	53·0	9th
1. SCOTLAND, E.	Glenalmond	30·249	39·3	39·2	39·3	34·9	44·8	39·9	23·0	14th	57·6	18th
2. ENGLAND, N.E.	Seaham	30·202	41·3	39·7	40·5	35·9	45·1	40·5	25·0	30th	55·7	18th
	Durham*	30·209	41·6	37·7	39·7	33·5	45·0	39·3	24·8	30th	58·1	18th
	Hull	30·212	39·6	38·9	39·3	34·9	45·2	40·1	25·0	22nd	55·5	18th
	Kelstern 𝔐	30·215	37·2	36·6	36·9	32·8	43·3	38·1	24·5	22nd	55·5	7th
3. ENGLAND, E.	Hillington 𝔐	30·193	38·5	37·0	37·8	32·3	43·8	38·1	20·1	16th 23rd	55·6	18th
	Chigwell Row	30·246	37·7	37·5	37·6	33·7	43·4	38·6	19·8	23rd	56·0	18th
4. MIDLAND COUNTIES.	Wakefield 𝔐	30·231	40·0	39·3	39·7	34·2	45·7	40·0	21·7	15th	58·3	9th
	Buxton 𝔐	30·243	36·2	36·9	36·6	31·0	42·7	36·9	12·0	22nd	52·4	18th
	Cheadle 𝔐	30·247	37·4	37·5	37·5	33·4	43·2	38·3	22·1	30th	52·2	6th
	Leicester	30·226	38·7	39·0	38·9	34·0	44·5	39·3	23·5	15th	55·2	18th
	Uppingham	30·223	37·1	36·9	37·0	33·3	42·7	38·0	23·4	22nd	53·0	18th
	Oscott	30·245	37·8	37·7	37·8	33·9	43·8	38·9	21·0	22nd	53·1	18th
	Churchstoke 𝔐	30·282	38·5	38·2	38·4	33·2	44·5	38·9	20·8	22nd	55·2	18th
	Cheltenham 𝔐	30·350	38·3	37·2	37·8	32·4	43·9	38·2	17·0	23rd	56·0	18th
5. ENGLAND, S.	Marlborough 𝔐	30·262	36·8	37·3	37·1	33·3	44·8	39·1	19·8	15th	54·9	18th
	Strathfield Turgiss 𝔐	30·243	37·7	37·1	37·4	32·1	44·5	38·3	16·9	16th	55·1	5th
	Ramsgate 𝔐	30·202	39·8	40·0	39·9	36·0	44·9	40·5	25·6	16th	52·3	18th
	Folkestone	30·197	40·2	—	—	—	—	—	26·7	?	55·9	18th
	Southampton	30·238	38·5	38·2	38·4	34·1	44·5	39·3	22·7	16th	56·6	18th
	Hastings	30·209	39·4	39·0	39·2	35·0	44·2	39·6	26·5	30th	53·8	18th
6. SCOTLAND, W.	Laudale	30·249	42·8	42·8	42·8	37·4	47·8	42·6	26·6	26th	56·5	16th
7. ENGLAND, N	Douglas (Isle of Man)	30·258	44·0	42·3	43·2	38·7	47·8	43·3	27·6	14th	57·0	18th
	Llandudno 𝔐	30·267	44·3	43·5	43·9	40·2	47·3	43·8	32·0	14th	54·2	19th
8. ENGLAND, S.W.	St. David's (Pembroke)	30·273	44·7	43·3	44·0	40·1	47·4	43·8	29·1	22nd	54·0	19th
	Caermarthen 𝔐	30·265	42·1	40·6	41·4	36·3	48·1	42·2	24·7	30th	60·6	18th
	Dartmoor 𝔐	30·261	36·7	35·8	36·3	32·1	40·9	36·5	21·0	22nd	50·5	18th 19th
	Babbacombe 𝔐	30·256	41·9	40·8	41·4	37·0	47·6	42·3	25·4	14th	59·8	18th
9. IRELAND, N.	Londonderry	30·313	42·6	43·0	42·8	38·5	47·2	42·9	29·0	26th	57·0	18th
	Brookeborough	30·278	40·1	40·3	40·2	35·3	46·5	40·9	23·8	30th	54·9	18th
	Markree Castle	30·312	42·7	41·6	42·2	37·5	48·5	43·0	26·2	28th	57·4	17th 19th
10. IRELAND, S.	Dublin	30·304	43·5	43·3	43·4	39·9	47·8	43·9	30·3	30th	55·3	18th
	Parsonstown	30·328	40·8	40·3	40·6	36·7	48·0	42·4	25·7	2nd	57·8	19th
CHANNEL	Jersey (St. Aubin's)	30·250	45·2	44·2	44·7	40·0	48·6	44·3	30·4	28th	55·9	18th

NOTE.—The stations marked thus 𝔐 are in connexion with the Royal Meteorological Society.

* At Durham the observations were taken at 10 a.m. and 10 p.m. each day.

STATIONS of the SECOND ORDER in the BRITISH ISLANDS, during the Month of NOVEMBER 1879.
corrected for Diurnal Range.

Latitude, beginning in each case with the Station lying furthest North.)

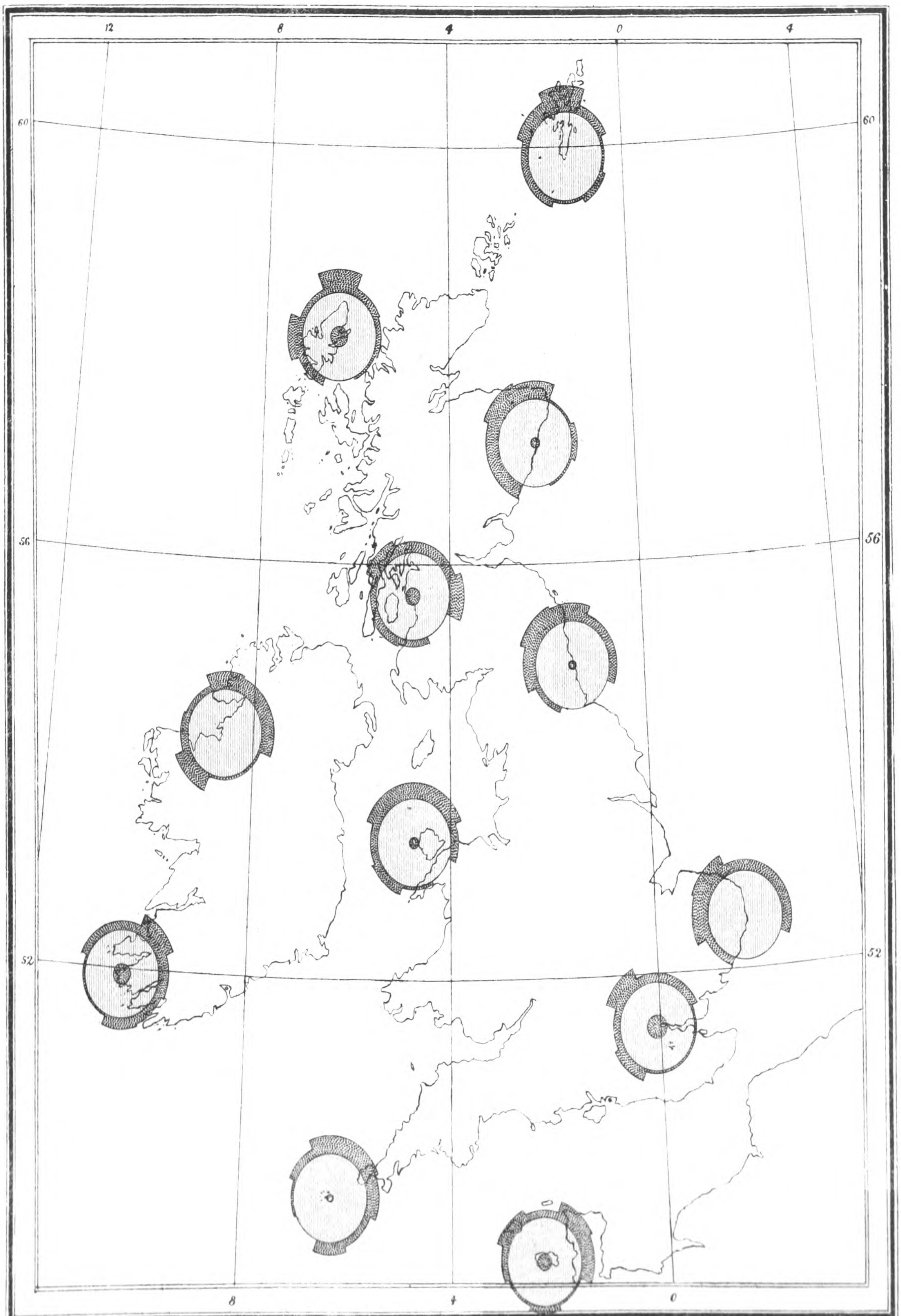
TENSION OF VAPOUR.			RELATIVE HUMIDITY.			AMOUNT OF CLOUD (0 to 10).			RAINFALL.			WEATHER. No. of Days of							WIND. No. of observations of								
At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
in.	in.	in.	%	%	%				ins.	ins.																	
0·236	0·233	0·235	88	88	88	7·7	7·8	7·8	3·620	0·520	16th	27	4	2	0	1	15	5	11	6	2	3	6	6	11	10	5
·199	·193	·196	78	79	79	5·4	5·0	5·2	1·436	·591	9th	11	5	0	0	6	8	1	9	8	5	1	0	5	10	14	8
·225	·210	·218	87	86	87	6·7	5·2	6·0	3·442	·850	1st	19	6	7	1	4	10	3	5	9	1	0	4	6	20	12	3
·230	·207	·219	86	89	87	6·6	5·8	6·2	1·924	·340	9th	16	5	3	0	4	10	0	8	8	3	0	4	7	9	20	1
·217	·212	·215	89	90	90	6·9	5·7	6·3	1·660	·400	20th	16	4	2	0	5	13	0	16	7	6	0	1	4	5	7	14
·208	·208	·208	92	94	93	7·7	5·2	6·5	2·016	·436	20th	16	10	1	0	0	10	2	20	8	4	1	0	6	9	12	0
·211	·202	·207	89	90	90	8·2	5·7	7·0	1·814	·285	2nd	19	7	0	0	1	13	0	8	15	4	3	0	8	6	16	0
·205	·203	·204	90	91	91	7·5	6·1	6·8	0·830	·280	20th	10	5	1	0	4	14	0	15	7	3	4	1	3	5	15	7
·224	·220	·222	89	89	89	6·6	6·3	6·5	1·330	·330	20th	12	3	1	0	3	10	0	14	7	3	1	1	6	16	12	0
·205	·213	·209	93	94	94	7·5	5·2	6·4	1·950	·520	11th	13	12	2	0	3	12	0	2	9	17	9	1	7	7	8	0
·204	·204	·204	91	91	91	7·1	6·2	6·7	1·400	·460	20th	14	7	2	0	6	14	5	17	13	3	0	2	4	5	13	3
·204	·207	·206	87	87	87	9·0	7·2	8·1	1·090	·370	20th	16	8	0	0	1	19	0	12	15	2	0	3	12	4	8	4
·204	·201	·203	90	89	89	7·8	6·9	7·4	0·934	·320	20th	9	5	0	0	2	16	3	19	10	2	0	1	6	6	13	3
·209	·210	·210	89	89	89	7·6	6·5	7·1	1·140	·450	20th	16	7	0	0	5	17	0	19	10	0	1	2	8	9	10	1
·208	·207	·208	86	86	86	7·0	7·5	7·3	0·920	·315	20th	11	6	0	0	2	19	0	8	11	5	1	0	3	15	11	6
·208	·206	·207	87	90	88	7·6	6·6	7·1	1·320	·660	21st	13	6	0	1	3	15	0	8	5	7	0	5	0	5	5	25
·201	·208	·205	89	91	90	6·6	6·0	6·3	0·600	·150	23rd	11	6	0	0	5	13	0	9	8	1	0	0	1	4	7	30
·203	·205	·204	86	89	88	6·8	6·0	6·4	0·883	·382	21st	7	5	0	0	4	13	0	14	19	2	3	0	0	6	13	3
·218	·217	·218	88	87	88	8·5	6·9	7·7	0·830	·220	16th	15	6	1	0	0	15	0	5	3	7	5	4	3	15	6	12
·218	—	—	86	—	—	7·6	6·1	6·9	0·720	·390	20th	9	3	2	0	2	14	1	17	5	3	3	3	5	6	17	1
·209	·211	·210	87	88	88	6·7	5·0	5·9	0·511	·130	10th	8	4	0	0	6	10	0	8	23	1	1	1	2	4	16	4
·211	·206	·209	85	85	85	7·0	5·2	6·1	1·120	·550	21st	11	4	1	0	6	12	0	13	18	1	1	2	3	8	9	5
·230	·235	·233	82	83	83	6·2	6·7	6·5	3·460	·710	7th	13	3	3	0	3	13	5	7	0	9	4	1	7	7	7	18
·251	·242	·247	85	87	86	6·9	5·5	6·2	1·269	·390	21st	10	1	7	0	3	11	3	12	9	4	2	1	5	6	11	10
·238	·235	·237	81	81	81	7·1	7·1	7·1	0·980	·260	23rd	11	3	2	0	4	16	6	11	7	16	3	2	2	15	5	0
·247	·240	·244	82	83	83	6·9	6·5	6·7	0·998	·285	30th	11	3	4	0	1	10	0	8	17	7	2	1	7	6	11	1
·228	·225	·227	83	86	84	6·7	6·6	6·7	0·700	·180	11th	9	3	1	0	3	12	0	21	7	10	1	1	2	6	3	9
·207	·203	·205	93	95	94	8·0	7·2	7·6	0·480	·150	11th	7	3	0	0	1	15	0	5	15	15	0	2	2	3	8	10
·224	·219	·222	82	85	83	6·5	5·6	6·1	0·220	·120	24th	6	5	0	0	4	10	1	10	16	8	2	1	5	9	8	1
·239	·248	·244	86	88	87	7·2	7·6	7·4	1·610	·540	9th	20	2	3	0	2	17	0	9	15	8	0	5	10	7	2	4
·223	·223	·223	90	90	90	8·4	6·8	7·6	1·230	·600	9th	9	1	0	0	2	17	1	7	8	2	4	0	6	2	7	24
·241	·236	·239	86	87	86	7·8	6·4	7·1	1·084	·345	9th	16	0	1	0	4	14	0	8	7	5	3	2	4	6	4	21
·238	·238	·238	83	83	83	6·7	6·0	6·4	1·251	·368	9th	10	2	6	0	1	12	2	7	7	8	1	2	6	17	9	3
·237	·235	·236	91	91	91	7·8	6·0	6·9	0·860	·223	9th	16	1	0	0	2	12	0	10	7	2	5	8	6	6	9	7
·236	·231	·234	77	77	77	7·0	6·0	6·5	1·048	·315	10th	9	3	3	0	3	11	2	7	17	12	5	1	3	5	5	5

TABLE C., NOVEMBER.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at TELEGRAPHIC REPORTING STATIONS in the BRITISH ISLANDS, during the Month of NOVEMBER 1879. Observations are made at 8 a.m. daily.

(The Stations are grouped in Districts, and then arranged in order of Latitude, beginning in each case with the Station lying furthest North.)

NAMES OF DISTRICTS	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 8 a.m.	AIR TEMPERATURE.								TENSION OF VAPOUR.	RELATIVE HUMIDITY.	AMOUNT OF CLOUD (0 to 10).	RAINFALL.			WEATHER. No. of Days of							WIND. No. of Observations of								
				Means of			Absolute Extremes.																									
			At 8 a.m.	Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.				Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
		ins.	°	°	°	°	°		°		in.	%		ins.	ins.																	
0. SCOTLAND, N.	Sumburgh Head	30·112	41·2	37·6	45·0	41·3	27	30th	53	9th	0·223	87	8·3	2·74	0·46	16th	26	3	0	0	3	19	3	11	3	1	2	1	3	3	6	0
	Wick - -	30·174	41·4	36·2	46·0	41·1	21	26th	56	17th, 18th	·231	89	6·4	2·01	0·35	11th	21	1	0	0	6	13	1	6	2	0	4	4	1	7	6	0
	Stornoway -	30·193	41·6	37·6	45·1	41·4	27	30th	54	18th	·241	92	5·4	2·70	0·46	11th	22	2	1	0	8	9	6	9	3	2	1	0	3	7	2	3
1. SCOTLAND, E.	Nairn - -	30·211	40·6	37·1	44·8	41·0	25	14th, 15th	56	18th	·217	86	6·4	1·89	0·38	21st	16	3	0	0	5	11	2	0	2	1	2	1	4	5	8	7
	Aberdeen -	30·189	40·6	37·0	45·9	41·5	29	30th	56	7th	·206	82	5·1	2·91	0·49	21st	17	6	0	0	10	9	4	7	1	2	1	0	5	5	8	1
	Leith - -	30·228	40·9	36·6	47·1	41·9	26	15th	58	18th	·214	84	5·5	1·72	0·73	9th	13	1	0	0	12	11	0	5	4	3	0	0	4	8	4	2
2. ENGLAND, N.E.	Shields - -	30·211	40·3	36·1	45·3	40·7	28	30th	56	18th	·219	88	6·5	3·46	0·90	1st	22	9	4	0	7	13	10	7	3	3	0	0	2	6	8	1
	York - -	30·217	37·9	33·3	45·3	39·3	24	23rd	58	18th	·204	90	5·9	1·21	0·22	21st	15	3	0	0	10	13	0	9	3	2	2	3	0	5	6	0
	Spurn Head -	30·176	41·0	38·1	45·1	41·6	30	30th	52	5th	·227	89	6·8	1·60	0·32	20th	16	5	6	0	3	7	3	4	4	1	0	3	6	6	6	0
3. ENGLAND, E.	Yarmouth -	30·165	40·1	36·3	43·8	40·1	26	16th	52	7th	·219	89	6·7	2·45	0·55	30th	22	6	8	0	2	6	3	4	4	4	0	0	3	7	8	0
	Cambridge -	30·209	36·1	32·1	45·5	38·8	21	16th	55	7th, 17th, 18th.	·203	95	6·8	0·90	0·29	23rd	13	3	0	0	6	15	0	10	2	0	0	1	7	1	9	0
4. MIDLAND COUNTIES.	Nottingham -	30·237	37·5	32·8	44·2	38·5	17	15th	56	17th, 18th	·200	90	7·8	1·40	0·42	20th	15	5	1	0	6	20	0	10	2	0	0	2	3	2	7	4
	Oxford - -	30·247	36·5	34·0	44·0	39·0	22	15th, 16th	53	7th, 18th	·197	91	8·0	1·04	0·30	21st, 26th	14	3	0	0	5	21	0	6	1	2	0	2	0	8	4	7
5. ENGLAND, S.	London - -	30·215	37·2	33·3	44·4	38·9	19	16th	55	18th	·193	87	6·9	0·73	0·25	20th	10	4	1	0	4	14	1	4	4	1	1	1	4	3	8	4
	Dover - -	30·192	40·0	36·7	44·6	40·7	28	30th	53	17th	·211	86	4·7	0·61	0·17	20th	15	3	3	0	13	9	1	10	3	1	2	2	2	3	7	0
	Hurst Castle -	30·228	38·4	35·3	45·2	40·3	25	30th	56	18th	·218	94	6·3	0·32	0·14	20th	7	4	0	0	7	11	0	8	9	2	0	1	1	1	8	0
6. SCOTLAND, W.	Ardrossan -	30·251	41·1	37·3	46·5	41·9	29	14th, 30th	54	17th, 18th	·209	81	6·4	1·48	0·72	9th	12	1	0	0	9	15	1	4	4	7	0	2	3	2	6	2
7. ENGLAND, N.W.	Liverpool -	30·250	40·8	38·2	45·1	41·7	28	14th	53	9th	·221	88	6·9	1·41	0·52	23rd	9	1	0	0	7	14	2	5	6	1	3	2	2	7	4	0
	Holyhead -	30·261	45·3	42·9	48·5	45·7	35	15th	55	17th, 18th	·246	83	8·2	1·62	0·48	21st	13	2	1	0	2	17	1	6	6	3	0	1	4	3	6	1
8. ENGLAND, S.W.	Pembroke -	30·269	44·5	41·2	47·5	44·4	31	22nd	57	19th	·243	83	7·0	0·76	0·36	23rd	8	1	0	0	5	14	1	3	11	2	2	3	2	1	6	0
	Prawle Point -	30·270	41·9	37·9	48·6	43·3	27	30th	62	18th	·232	88	6·9	0·78	0·52	24th	7	2	0	0	4	14	2	6	6	3	1	2	1	3	8	0
9. IRELAND, N.	Donaghadee -	30·282	43·8	40·6	47·9	44·3	30	14th, 15th	58	9th, 19th	·242	84	5·1	0·99	0·71	9th	8	0	0	0	8	2	4	7	6	4	1	1	4	4	3	0
	Mullaghmore -	30·287	45·0	41·6	48·4	45·0	32	15th	56	18th	·260	87	8·2	1·31	0·62	9th	13	0	2	1	3	18	7	6	5	5	1	1	7	3	2	0
10. IRELAND, S.	Kingstown -	30·294	44·2	42·0	48·4	45·2	35	2nd, 14th, 30th.	57	17th, 18th	·236	81	6·5	1·41	0·35	9th	13	0	2	0	4	12	5	1	3	4	2	1	0	6	11	2
	Valencia - -	30·315	45·6	42·1	50·4	46·3	34	30th	57	19th	·254	83	7·1	0·79	0·20	22nd	9	0	0	0	1	9	1	3	8	4	3	4	1	1	3	3
	Roche's Point -	30·299	44·6	40·9	49·2	45·1	33	2nd, 30th	56	17th, 19th	·245	83	6·0	1·31	0·55	23rd	5	1	0	0	5	10	0	7	9	1	2	2	2	3	4	0
CHANNEL ISLANDS	Scilly - -	30·255	47·7	45·3	50·0	47·7	38	27th, 28th, 29th, 30th.	56	20th	·276	84	8·5	2·77	1·57	24th	12	0	1	0	0	18	8	7	7	5	2	4	0	1	3	1
	Jersey - -	30·202	43·5	40·2	47·4	43·8	31	21st, 28th, 29th.	55	18th	·233	82	6·1	0·93	0·27	10th	10	3	4	0	6	10	5	3	8	6	1	2	1	2	5	2

MONTHLY WIND CHART FOR NOVEMBER, 1879.

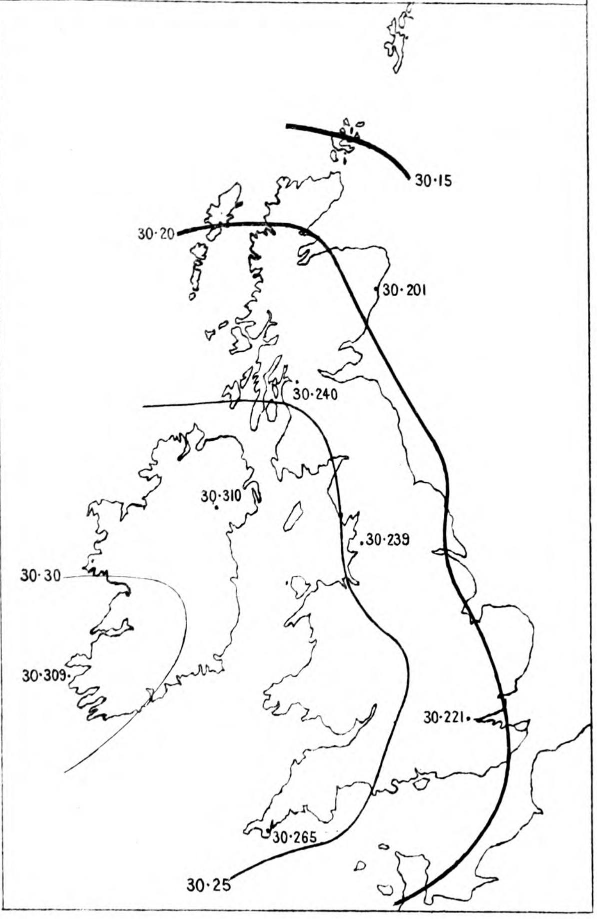

12
8
4
0
4
60
60
56
56
52
52
8
4
0

To face p. 140

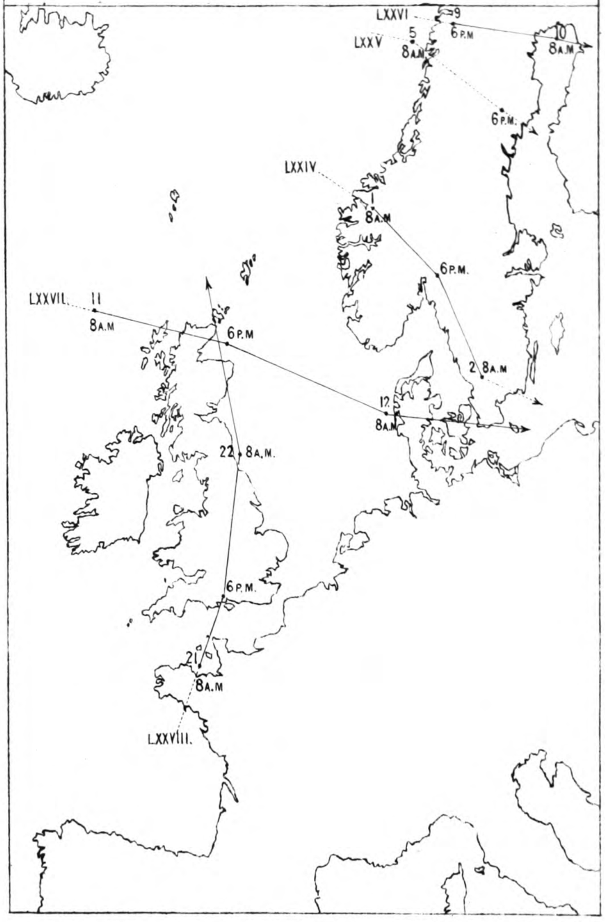
DANGERFIELD, LITH. 22, BEDFORD ST COVENT GARDEN. 17640

MONTHLY WEATHER CHART. NOVEMBER, 1879.

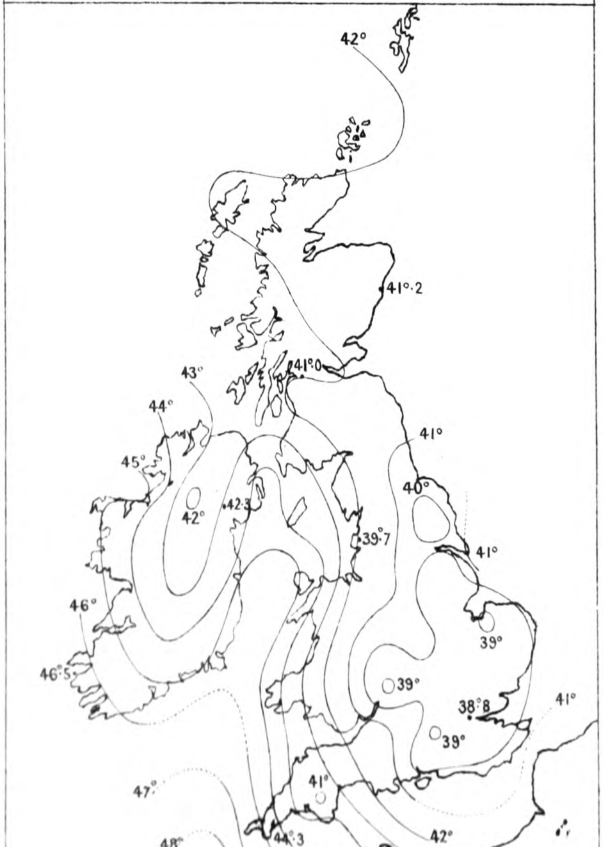
1. DISTRIBUTION OF MEAN PRESSURE


30·15
30·20
30·201
30·240
30·310
30·239
30·30
30·309
30·221
30·265
30·25

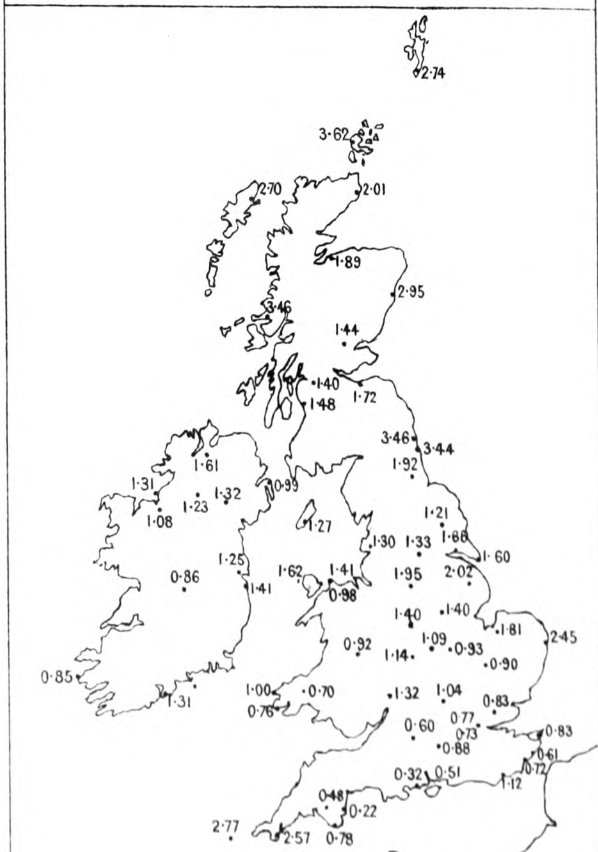
2. MOVEMENTS OF DEPRESSIONS.


LXXVI
9
6 P.M
10
8 A.M
LXXV
5
8 A.M
6 P.M.
LXXIV
1
8 A.M
6 P.M.
LXXVII.
11
8 A.M
6 P.M
2
8 A.M
12
8 A.M
22
8 A.M.
6 P.M.
21
8 A.M
LXXVIII.

3. DISTRIBUTION OF MEAN TEMPERATURE


42°
41°·2
41°·0
43°
44°
41°
45°
40°
42°
42·3
39°·7
41°
46°
39°
46°·5
39°
38°·8
41°
39°
47°
41°
48°
44°·3
42°
43°
45°
44°
47°
46°

4. RAINFALL


2·74
3·62
2·70
2·01
1·89
2·95
3·46
1·44
1·40
1·48
1·72
3·46
3·44
1·61
1·92
1·31
1·32
0·99
1·23
1·08
1·21
1·27
1·30
1·33
1·66
1·25
1·60
0·86
1·62
1·41
1·95
2·02
1·41
0·98
1·40
1·40
1·81
2·45
0·92
1·09
0·93
1·14
0·90
0·85
1·31
1·00
0·70
1·32
1·04
0·83
0·76
0·77
0·73
0·60
0·83
0·88
0·61
0·72
0·32
0·51
1·12
0·48
0·22
2·77
2·57
0·78
1·05

To follow Wind Chart for November.

Dangerfield Lith. 22, Bedford St. Covent Garden. /7641.

REMARKS FOR DECEMBER 1879.

Tables A. to C., with Monthly Wind and Weather Charts.

Wind.—On the morning of the 1st the wind was generally Northerly in direction, but in the course of a few hours a change began, which shortly resulted in the establishment of an Easterly current over the Channel and southern England, while further north both the direction and force became very variable. During the 3rd the Easterly wind freshened a good deal and rose to a gale which continued throughout the 4th, when it gave way before a Westerly current which extended itself southwards over the whole kingdom, and which varied in force from a light to a fresh breeze. This was followed on the 6th by another spell of light to moderate anticyclonic airs, which, at the northern stations, were mostly from the Westward, but were rather more variable both in direction and force over England, till by the close of the 13th, the high pressure area having moved somewhat to the eastward, the wind became generally South-westerly or Westerly. The next change of importance began on the 17th, when an Easterly breeze again set in over the Channel, while further northward, over central Britain, calms and light variable airs prevailed; the Easterly current soon increased to a fresh breeze, and shortly afterwards a retrograde movement took place over the remainder of the United Kingdom, and Southerly or South-easterly winds became general. On the 22nd the wind veered again to South-west and West, and in Ireland it blew with the force of a gale for several hours, till on the 25th it again backed for a little while to the Southward and became generally light. At the western stations, however, it soon freshened again and a Southerly gale set in, which quickly spread to Scotland and the western portion of England, and continued till the close of the 27th. On the 28th the direction veered to West and the force greatly increased, and throughout the remainder of the month strong Westerly winds and heavy gales prevailed.

The monthly chart shows that, upon the whole, the predominant winds were from between South and West, but that Easterly winds were very frequent at the Channel stations, and were also felt, but to a less extent, over the whole of southern England and in Ireland.

Pressure.—Owing to the prevalence of anticyclonic conditions the mean pressure for the month was considerably higher than the average, varying from upwards of 30·3 inches over south-eastern England to a little less than 30·0 inches in the Shetland Islands. The range of pressure was greatest at the northern stations, amounting to nearly 1·9 inches at Aberdeen, while it was less than 1·1 inches at Valencia. During the night of the 22nd–23rd very high readings were recorded over the south of England, the mercury rising to 30·807 at Falmouth, and to 30·822 at Kew; further north the maxima were not so high, and were recorded during the night of the 12th over Ireland and northern England, and on the 19th in Scotland. The lowest reading occurred at Aberdeen on the 28th, when the mercury fell to 28·789 inches; at all the other observatories the minimum was registered on the 30th, except at Falmouth and Kew, where it occurred on the 4th.

Movements of the Depressions.—Anticyclonic conditions prevailed over the British Isles during the greater part of the month, and it was not till quite at its close that any important depressions were experienced. At the beginning of the month a not very deep depression travelled in an easterly direction across France to Austria, after which no system of importance was observed till the last week of the month, when another depression also travelling to the eastward was observed, but far to the northward of the British Isles. This was, however, quickly succeeded by a series of deep depressions which followed each other in rapid succession along a north-easterly course which lay close to our north-western shores, and which caused a week of stormy weather all over the United Kingdom.

Temperature.—The mean temperature for the month was considerably below the average over the greater part of England and Ireland, although over the northern portion of the kingdom the difference from the normal was much less marked. The lowest mean values are those for the south-eastern and midland counties of England, the mean for Norfolk being about 31°, from whence it increased to nearly 45° at Scilly and Valencia, and to 40° at the Orkneys and Shetlands. Exceptionally low minimum readings were registered early in the month, generally near the 7th; at Buxton the thermometer fell to −3°·8, at Nottingham to −2°, and at Cambridge, York, and Wakefield to zero, Fahrenheit. The maximum readings occurred, almost without exception, towards the close of the month, when a cyclonic distribution of pressure had succeeded the anticyclonic conditions which had accompanied the minima; at Kingstown 59° was reached, and at London and Leith 57°, while generally the maximum readings of the thermometer, more or less, exceeded 50°. The range of temperature was, in consequence of these extreme readings, generally large, and at many stations remarkably so; thus at Nottingham it amounted to 58°, at Wakefield, York, and Buxton to 56°, at Cambridge to 54°, at Leicester to 52°, and at Leith to 50°, while at many other stations it considerably exceeded 40°.

Vapour Tension.—The mean tension of vapour was very uniform in amount over the greater part of the British Isles, the values being as a rule about ·18 inch; along the western littoral they were slightly higher, and at the stations in the extreme south-west the mean was as high as ·25 inch. *Relative Humidity* was also pretty uniform in its distribution, although the per centages in the north-east and in the south-west were rather lower than those reported from the remainder of the kingdom.

Rainfall.—The fall of rain was again below the average amount all over the United Kingdom, the deficiency being especially marked at the English stations. In almost all cases the heaviest falls occurred with the stormy weather experienced at the close of the month, although at some English stations the maximum amounts were recorded during the first few days of the month; as a rule, however, the maximum daily falls were not very heavy. At Buxton 1·82 fell on the 31st, but an inch in 24 hours was only recorded at a few other stations at which the normal rainfall is exceptionally large.

TABLE A., DECEMBER.—SHOWING the MEAN and EXTREME PRESSURES and TEMPERATURES recorded at each of the SEVEN SELF-RECORDING OBSERVATORIES of the METEOROLOGICAL OFFICE during the Month of DECEMBER 1879; together with the MONTHLY VAPOUR TENSION, the RELATIVE HUMIDITY, and TOTAL RAINFALL.

NAMES OF OBSERVATORIES.	PRESSURE at 32° F. and the Mean Sea Level (In English Inches).						TEMPERATURE In the Shade (In Degrees Fahrenheit).						HYGRO-METRIC VALUES.		RAIN-FALL (In English Inches).
	Mean for the Month.	Extremes.				Range.	Mean for the Month.	Extremes.				Range.	Tension of Vapour (In English Inches).	Relative Humidity (Saturation = 100).	
		Minimum.		Maximum.				Minimum.		Maximum.					
		Reading.	Date.	Reading.	Date.			Reading.	Date.	Reading.	Date.				
	ins.	ins.	D. H.	ins.	D. H.	ins.	°	°	D. H.	°	D. H.	°	in.	%	ins.
Valencia - -	30·201	29·564	30th, 6 a.m.	30·646	13th, 3 a.m.	1·082	44·5	29·4	4th, 7 p.m.	55·3	28th, 3 p.m.	25·9	·243	83	3·085
Armagh - -	·207	·262	30th, 9 a.m.	·709	12th, 11 p.m.	1·447	36·1	17·9	2nd, 8 a.m.	53·7	28th, 4 p.m.	35·8	·187	87	1·735
Glasgow - -	·156	29·078	30th, 1 p.m.	·673	12th, 11 p.m. 19th, 10 a.m.	1·595	36·3	13·5	4th, 7 a.m.	53·3	28th, 5 p.m.	39·8	·190	89	2·428
Aberdeen - -	·101	28·789	28th, 9 p.m.	·668	19th, 8 p.m.	1·879	35·3	14·6	3rd, 4 a.m. 4th, 9 a.m.	52·6	23rd, 1 p.m.	38·0	·166	80	0·995
Falmouth - -	·314	29·397	4th, 4 a.m.	·807	22nd, 11 p.m.	1·410	41·9	27·6	5th, 0.15 a.m.	52·5	28th, 1 p.m. 6 p.m.	24·9	·215	82	2·585
Stonyhurst - -	·264	·302	30th, 1 p.m.	·768	12th, 11 p.m.	1·466	33·5	12·9	7th, 3 a.m.	52·7	28th, 6 p.m.	39·8	·166	86	3·462
Kew - -	30·328	29·520	4th, 8 p.m. 11 p.m.	30·822	23rd, 3 a.m.	1·302	32·7	13·5*	7th, 9 a.m.	53·9	31st, 8 p.m.	40·4	·167	92	0·760

* Approximate reading.

TABLE B., DECEMBER.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at
The values are not

(The Stations are grouped in Districts, and then arranged in order of

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 9 a.m. and 9 p.m.	AIR TEMPERATURE.									
			At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Means of			Absolute Extremes.			
						Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.
		ins.	°	°	°	°	°	°	°		°	
0. SCOTLAND, N.	Orkneys (Sandwick Manse)	29·976	38·9	39·7	39·3	35·1	44·2	39·7	21·0	4th	52·0	23rd
1. SCOTLAND, E.	Glenalmond	30·158	32·9	34·1	33·5	28·1	39·4	33·8	10·0	4th	50·0	28th
2. ENGLAND, N.E.	Seaham	30·205	35·2	34·5	34·9	29·0	39·8	34·4	11·8	3rd, 4th	50·3	29th
	Durham*	30·219	33·5	31·9	32·7	25·8	39·7	32·8	4·4	4th	53·4	28th
	Hull	30·274	31·7	32·7	32·2	27·0	37·8	32·4	10·0	7th	53·2	28th
	Kelstern 𝔐	30·291	29·5	31·2	30·4	25·3	36·4	30·9	8·2	7th	52·9	28th, 29th
3. ENGLAND, E.	Hillington 𝔐	30·295	30·4	30·1	30·3	24·0	35·9	30·0	5·2	7th	52·6	28th
	Chigwell Row	30·351	31·5	32·0	31·8	26·7	37·4	32·1	13·1	7th	53·0	31st
4. MIDLAND COUNTIES.	Wakefield 𝔐	30·264	31·3	33·6	32·5	25·0	40·3	32·7	0·6	7th	56·0	28th
	Buxton 𝔐	30·305	30·1	31·4	30·8	23·1	38·1	30·6	—3·8	7th	51·7	28th
	Cheadle 𝔐	30·298	31·7	33·1	32·4	28·2	38·1	33·2	17·6	5th	52·8	28th
	Leicester	30·295	30·5	32·3	31·4	25·8	37·2	31·5	3·0	2nd	54·9	29th
	Uppingham	30·301	31·0	32·1	31·6	27·1	37·0	32·1	15·5	2nd	53·5	28th
	Oscott	30·302	31·7	32·9	32·3	27·2	38·1	32·7	7·1	7th	54·0	28th
	Churchstoke 𝔐	30·319	32·8	34·6	33·7	27·9	40·1	34·0	15·2	2nd	53·3	28th
	Cheltenham 𝔐	30·318	32·0	32·9	32·5	24·8	38·5	31·7	11·2	1st	54·5	28th
5. ENGLAND, S.	Marlborough 𝔐	30·338	31·0	32·2	31·6	26·4	38·7	32·6	13·4	7th	53·3	28th
	Strathfield Turgiss 𝔐	30·335	31·2	31·6	31·4	24·7	37·3	31·0	10·3	7th	52·2	29th
	Ramsgate	30·337	32·5	33·4	33·0	27·9	38·1	33·0	20·9	7th	50·5	31st
	Folkestone	30·338	32·9	—	—	27·2	38·3	32·8†	11·8	17th	48·3	31st
	Southampton	30·332	32·8	33·5	33·2	27·9	39·2	33·6	17·0	7th	51·6	29th
	Hastings	30·335	33·7	34·3	34·0	29·2	38·5	33·9	17·6	17th	49·0	31st
6. SCOTLAND, W.	Laudale	30·096	38·7	40·4	39·6	33·4	45·0	39·2	18·4	3rd	56·0	22nd
7. ENGLAND, N.W.	Douglas (Isle of Man)	30·220	38·8	38·7	38·8	32·8	44·8	38·8	19·0	5th	53·6	31st
	Llandudno 𝔐	30·249	38·7	39·1	38·9	34·1	44·2	39·2	23·0	4th, 5th	56·0	28th
8. ENGLAND, S.W.	St. David's (Pembroke)	30·281	38·6	39·5	39·1	34·4	43·3	38·9	21·6	4th	51·6	31st
	Caermarthen 𝔐	30·301	34·7	35·0	34·9	28·9	43·0	36·0	17·9	5th	53·4	29th
	Dartmoor 𝔐	30·329	33·1	32·2	32·7	26·6	37·4	32·0	18·0	2nd	49·0	29th
	Babbacombe 𝔐	30·323	36·5	37·3	36·9	32·1	42·8	37·5	22·8	13th	52·3	28th
9. IRELAND, N.	Londonderry	30·167	35·7	37·2	36·5	31·1	41·7	36·4	16·0	4th	53·7	28th
	Brookeborough	30·159	32·6	35·1	33·9	27·6	41·2	34·4	8·8	5th	55·4	28th
	Markree Castle	30·174	35·0	36·5	35·8	29·8	42·7	36·3	16·0	2nd	55·2	28th
10. IRELAND, S.	Dublin	30·237	37·1	38·5	37·8	32·9	42·9	37·9	21·8	5th	56·6	28th
	Parsonstown	30·232	33·9	35·7	34·8	29·3	42·8	36·1	9·8	5th	56·8	28th
CHANNEL	Jersey (St. Aubin's)	30·366	37·8	37·4	37·6	32·6	42·4	37·5	22·7	3rd	52·0	22nd

NOTE.—The stations marked thus 𝔐 are in connexion with the Royal Meteorological Society.

* At Durham the observations were taken at 10 a.m. and 10 p.m. each day.

† Somewhat doubtful.

STATIONS of the SECOND ORDER in the BRITISH ISLANDS during the Month of DECEMBER 1879, corrected for Diurnal Range.

Latitude, beginning in each case with the Station lying furthest North.)

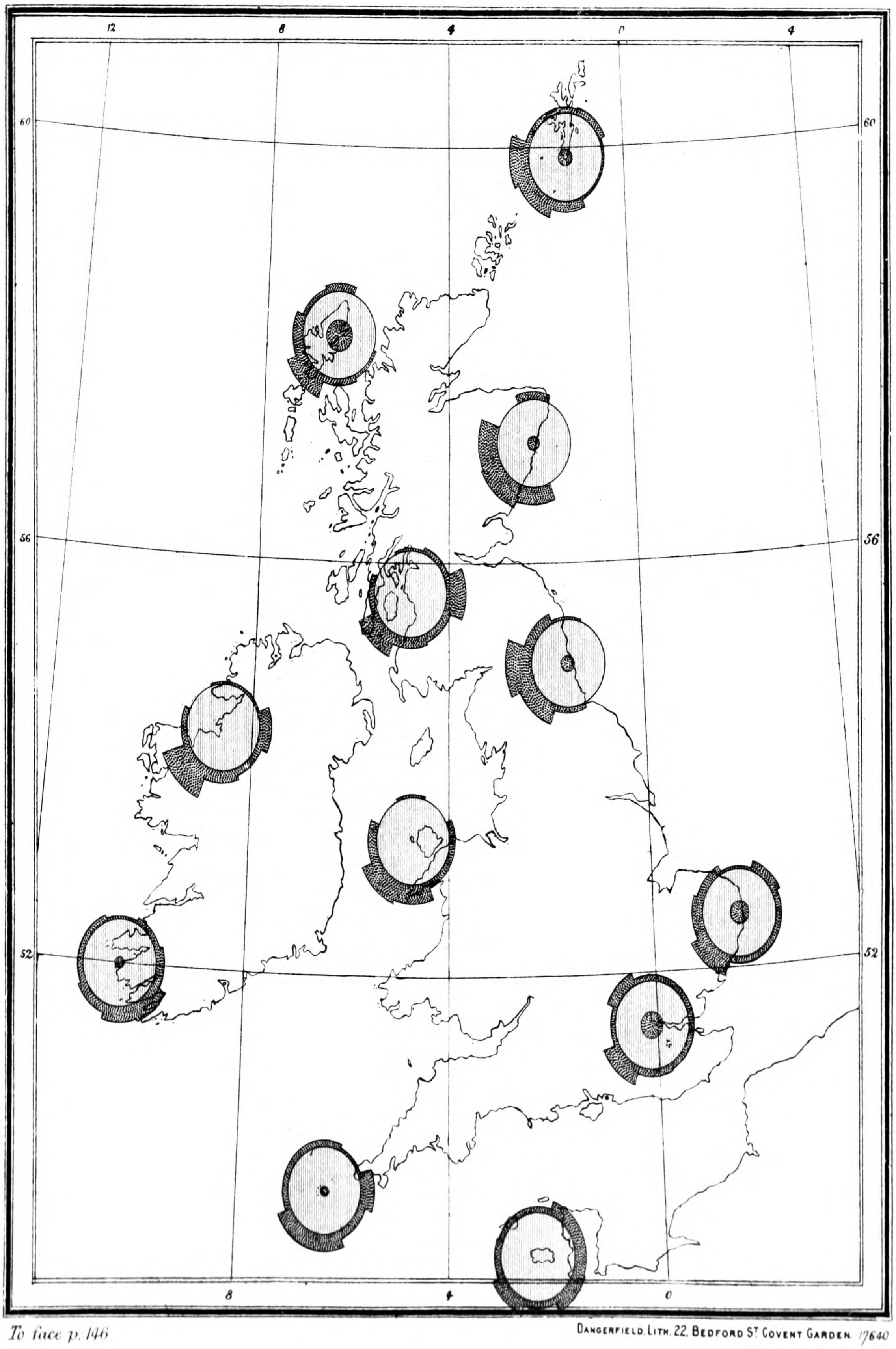
TENSION OF VAPOUR.			RELATIVE HUMIDITY.			AMOUNT OF CLOUD (0 to 10).			RAINFALL.			WEATHER, No. of Days of							WIND, No. of Observations of								
At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	At 9 a.m.	At 9 p.m.	Mean of 9 a.m. and 9 p.m.	Total Fall in the Month.	Maximum Fall in One Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
in.	in.	in.	%	%	%				ins.	ins.																	
·214	·212	·213	91	87	89	5·3	5·7	5·5	3·190	·490	3rd	23	8	0	0	4	7	8	3	2	1	1	14	16	13	5	7
·170	·177	·174	86	86	86	6·4	5·5	6·0	2·934	1·085	27th	11	7	0	0	6	10	3	1	2	3	1	1	13	29	2	10
·184	·178	·181	89	88	89	5·4	3·3	4·4	0·694	·144	5th	9	3	2	0	5	2	0	0	1	0	2	12	29	11	4	3
·175	·169	·172	89	89	89	6·8	3·8	5·3	0·603	·110	1st, 5th	8	4	1	0	6	10	0	1	1	0	2	23	16	5	7	7
·167	·175	·171	93	94	94	6·8	6·7	6·8	0·960	·230	27th	11	5	1	0	2	13	0	0	8	3	2	3	14	24	3	5
·158	·168	·163	93	93	93	6·3	6·3	6·3	1·055	·400	31st	10	6	0	0	2	11	2	6	5	5	2	8	17	10	6	3
·160	·160	·160	91	91	91	8·2	5·9	7·1	0·627	·120	1st	12	6	0	0	2	14	1	1	8	5	7	2	29	3	7	0
·173	·170	·172	98	93	96	8·7	7·2	8·0	0·910	·270	30th	9	6	1	1	2	19	0	5	8	11	3	2	5	8	6	14
·174	·191	·183	91	94	93	8·2	7·5	7·9	1·560	·370	31st	10	4	0	0	1	18	1	10	3	1	4	12	10	13	8	1
·167	·173	·170	97	94	96	6·9	7·9	7·4	3·940	1·820	31st	10	4	0	0	0	13	0	1	3	7	5	1	13	26	4	2
·161	·174	·168	90	93	92	6·9	5·3	6·1	1·340	·620	31st	8	5	1	0	4	11	5	3	3	7	4	9	8	3	4	21
·152	·161	·157	90	88	89	9·4	8·8	9·1	0·950	·340	31st	11	3	1	0	0	25	0	5	6	0	4	1	32	1	2	11
·167	·169	·168	93	89	91	7·8	7·4	7·6	1·074	·318	31st	17	5	0	0	1	15	1	6	5	2	4	7	15	12	5	6
·175	·180	·178	94	93	93	8·7	5·9	7·3	0·710	·200	30th	7	5	1	0	2	17	4	8	8	1	2	13	16	7	3	4
·167	·179	·173	84	86	85	7·5	7·6	7·6	1·294	·640	30th	11	4	1	0	0	14	0	7	10	7	5	2	19	6	6	0
·170	·171	·171	89	90	90	7·5	6·1	6·8	0·840	·180	30th	12	3	0	0	1	15	0	2	4	3	7	5	5	1	1	34
·169	·175	·172	94	93	93	7·9	6·6	7·3	1·092	·345	31st	10	4	1	0	4	18	0	4	3	4	2	0	10	2	0	37
·160	·158	·159	86	85	86	7·7	6·7	7·2	1·207	·439	30th	8	5	1	1	3	17	0	7	12	4	10	1	12	1	7	8
·175	·182	·179	93	93	93	7·9	7·4	7·7	1·360	·420	7th	11	4	1	0	0	16	1	2	5	6	2	1	16	8	1	21
·178	—	—	93	—	—	7·0	6·5	6·8	1·210	·540	30th	10	3	1	1	3	12	1	12	9	9	2	7	8	6	4	5
·171	·180	·176	87	90	89	7·7	5·6	6·7	0·755	·290	31st	7	2	2	1	5	14	1	6	15	6	6	1	9	4	7	8
·172	·177	·175	86	87	86	6·5	5·8	6·2	0·955	·285	28th	10	5	2	0	5	13	4	5	17	3	3	11	10	5	5	3
·209	·221	·215	85	85	85	6·0	6·5	6·3	6·740	1·640	27th	18	6	1	0	5	12	6	0	2	13	3	15	12	10	1	6
·219	·220	·220	91	91	91	7·7	4·9	6·3	2·407	·562	27th	9	3	1	0	3	7	4	1	3	4	6	6	10	8	1	23
·200	·201	·201	82	82	82	5·8	6·1	6·0	1·475	·345	31st	11	4	1	0	5	10	4	1	2	3	6	4	12	30	2	0
·223	·229	·226	93	92	92	6·2	5·7	6·0	2·119	·450	21st	17	3	5	2	4	11	2	0	10	18	11	4	11	4	3	1
·189	·193	·191	90	92	91	5·7	4·3	5·0	2·050	·670	27th	11	1	2	1	9	11	3	3	6	11	3	2	6	6	1	24
·188	·183	·186	97	98	97	7·2	7·1	7·2	4·160	1·000	27th	6	2	0	0	3	14	1	2	10	12	7	0	6	12	3	10
·195	·198	·197	88	86	87	6·6	6·0	6·3	1·440	·330	27th	13	2	1	1	3	12	4	8	8	10	4	4	12	8	5	3
·192	·207	·200	88	89	88	6·1	5·7	5·9	2·340	·720	30th	14	3	2	0	4	9	1	1	2	2	3	7	24	10	1	12
·169	·189	·179	90	92	91	7·9	6·2	7·1	2·819	·935	30th	8	2	0	1	3	15	3	1	4	0	9	5	13	3	0	27
·193	·205	·199	92	90	91	6·2	6·6	6·4	2·037	·469	30th	16	1	1	0	3	12	0	0	0	5	14	7	9	4	1	22
·197	·209	·203	86	87	87	5·5	5·5	5·5	1·012	·239	31st	10	4	3	0	4	6	4	0	0	2	4	9	10	20	8	9
·191	·199	·195	93	89	91	6·3	4·6	5·5	1·859	·423	30th	16	2	1	0	6	9	4	2	2	1	12	20	7	5	1	12
·189	·189	·189	81	82	81	5·4	5·1	5·3	0·874	·280	28th	9	2	2	1	5	8	3	6	7	11	13	7	6	6	3	3

TABLE C., DECEMBER.—Giving a SUMMARY of the METEOROLOGICAL OBSERVATIONS made at TELEGRAPHIC REPORTING STATIONS in the BRITISH ISLANDS during the Month of DECEMBER 1879. Observations are made at 8 a.m. daily.

(The Stations are grouped in Districts, and then arranged in order of Latitude, beginning in each case with the Station lying furthest North.)

NAMES OF DISTRICTS.	NAMES OF STATIONS.	Mean Height of Barometer (at 32° Fahrenheit and Mean Sea Level) from Observations made at 8 a.m.	AIR TEMPERATURE.								TENSION OF VAPOUR.	RELATIVE HUMIDITY.	AMOUNT OF CLOUD (0 to 10).	RAINFALL.			WEATHER. No. of Days of							WIND. No. of Observations of								
			At 8 a.m.	Means of			Absolute Extremes.							Total Fall in the Month.	Maximum Fall in one Day.	Date.	Rain.	Snow.	Hail.	Thunderstorms.	Clear Sky.	Overcast.	Gales.	North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
				Minima.	Maxima.	Min. and Max. combined.	Minimum.	Date.	Maximum.	Date.																						
		ins.	°	°	°	°	°		°		in.	%		ins.	ins.																	
0. SCOTLAND, N.	Sumburgh Head	29·972	40·6	35·3	43·5	39·4	23	5th	51	14th, 15th, 22nd, 23rd.	0·206	82	7·5	4·09	0·83	28th	21	2	0	0	3	14	8	2	3	1	1	4	7	9	2	2
	Wick	30·020	37·8	30·8	42·4	36·6	15	3rd	54	14th	·203	90	7·5	1·33	0·26	28th	15	3	0	0	1	14	4	0	1	0	1	5	7	8	8	1
	Stornoway	29·985	39·4	34·0	43·5	38·8	22	2nd	53	22nd	·220	91	5·0	4·18	0·82	28th	18	1	0	0	9	8	7	3	0	0	1	2	10	5	2	8
1. SCOTLAND, E.	Nairn	30·069	36·1	32·2	41·5	36·9	14	3rd	53	22nd, 27th	·185	86	4·2	1·27	0·26	29th	16	5	1	0	12	5	3	0	2	0	0	0	5	10	1	13
	Aberdeen	30·106	33·3	28·6	40·8	34·7	13	3rd	54	23rd	·156	82	4·4	0·95	0·26	27th	12	5	1	0	14	6	6	3	0	0	0	7	10	9	0	2
	Leith	30·167	35·0	29·5	42·9	36·2	7	4th	57	28th	·176	86	5·9	1·32	0·38	29th	13	2	0	0	6	6	0	2	0	0	1	2	7	14	5	0
2. ENGLAND, N.E.	Shields	30·222	34·3	29·2	41·2	35·2	10	4th	56	28th	·182	92	6·5	0·95	0·35	5th	9	5	1	0	5	14	7	1	0	0	0	2	8	14	4	2
	York	30·272	29·2	24·0	38·5	31·3	0	7th, 8th	56	31st	·147	92	6·2	1·01	0·22	30th	13	3	0	0	9	13	0	3	3	1	7	8	5	2	2	0
	Spurn Head	30·251	34·3	30·1	40·0	35·1	25	2nd, 3rd, 7th, 8th, 27th.	52	28th	·170	85	7·0	0·46	0·13	31st	9	4	0	0	4	12	3	3	3	2	4	7	8	2	2	0
3. ENGLAND, E.	Yarmouth	30·296	32·0	27·1	37·2	32·2	15	7th, 8th	52	31st	·162	90	6·8	0·79	0·18	31st	12	3	0	0	5	13	2	1	4	2	2	2	8	5	3	4
	Cambridge	30·312	28·9	23·5	38·0	30·8	0	7th, 8th	54	28th	·141	89	7·6	0·85	0·45	5th	10	4	0	0	7	22	0	4	1	2	0	12	4	3	3	2
4. MIDLAND COUNTIES.	Nottingham	30·313	29·8	23·8	37·6	30·7	−2	8th	56	28th	·152	91	7·6	1·25	0·46	31st	8	4	0	0	7	21	2	4	2	0	1	6	6	0	1	11
	Oxford	30·331	30·7	25·7	38·6	32·2	12	7th, 8th	53	28th	·158	92	8·8	0·82	0·19	31st	14	1	0	0	3	26	0	2	5	2	0	2	1	6	2	11
5. ENGLAND, S.	London	30·322	31·2	25·6	39·1	32·4	13	7th	57	31st	·161	92	7·6	0·61	0·22	30th, 31st	7	5	0	1	6	21	1	2	2	2	2	3	8	2	4	6
	Dover	30·319	33·7	29·1	38·2	33·7	18	17th	49	31st	·174	89	5·8	1·08	0·28	28th, 31st	13	3	0	1	11	14	4	5	3	2	3	1	9	4	3	1
	Hurst Castle	30·307	33·6	29·4	39·9	34·7	22	17th	48	28th	·186	97	7·1	0·88	0·36	30th	12	0	0	0	4	14	4	3	8	5	6	0	1	4	3	1
6. SCOTLAND, W.	Ardrossan	30·168	37·6	33·7	43·1	38·4	15	4th	53	28th	·196	87	7·0	2·36	0·68	31st	14	0	0	0	7	17	4	1	2	9	3	4	10	2	0	0
7. ENGLAND, N.W.	Liverpool	30·261	34·9	30·6	41·1	35·9	22	2nd, 3rd, 4th.	56	28th	·175	86	6·8	1·52	0·63	5th	8	0	0	0	6	12	3	1	1	3	13	4	4	2	0	3
	Holyhead	30·235	40·0	36·8	44·9	40·9	28	4th, 5th	53	28th	·218	89	5·7	1·71	0·43	27th	15	1	2	0	10	11	2	1	0	2	2	10	12	4	0	0
8. ENGLAND, S.W.	Pembroke	30·267	40·2	36·4	44·6	40·5	26	4th, 5th	51	28th, 31st	·220	89	6·1	1·82	0·56	21st	15	2	0	0	8	11	4	1	5	6	5	3	6	3	2	0
	Prawle Point	30·330	38·8	34·5	44·6	39·6	21	5th	52	22nd, 28th	·209	89	6·0	1·30	0·54	30th	10	2	1	1	9	13	3	7	4	3	4	3	4	1	5	0
9. IRELAND, N.	Donaghadee	30·227	37·7	32·6	43·9	38·3	20	5th	54	28th, 31st	·213	95	6·3	1·23	0·35	27th	12	0	0	0	4	11	3	0	2	2	1	4	9	13	0	0
	Mullaghmore	30·136	40·5	35·3	46·2	40·8	28	5th	54	27th, 28th	·222	89	5·7	3·05	0·67	31st	12	2	5	0	12	11	6	1	1	5	2	5	15	2	0	0
10. IRELAND, S.	Kingstown	30·230	39·3	34·3	45·5	39·9	23	3rd	59	28th	·204	85	5·9	1·10	0·26	29th	18	1	0	0	9	10	4	0	0	0	7	8	0	11	3	2
	Valencia	30·199	43·8	39·2	49·8	44·5	27	5th	56	27th, 28th, 31st.	·236	82	7·0	3·20	0·85	27th	14	0	2	0	4	14	7	1	2	4	8	6	4	2	2	2
	Roche's Point	30·224	41·6	37·1	46·5	41·8	26	2nd, 5th	55	31st	·229	88	6·6	3·47	1·08	27th	10	1	0	0	6	12	5	6	3	1	2	6	7	3	3	0
CHANNEL ISLANDS	Scilly	30·291	44·8	41·3	47·9	44·6	33	2nd	53	21st, 27th, 28th, 31st.	·253	85	8·2	1·20	0·37	30th	15	2	1	0	1	16	8	2	1	6	3	7	7	2	2	1
	Jersey	30·312	35·7	32·1	41·4	36·8	23	4th	50	31st	·178	84	5·5	0·73	0·16	28th	9	2	4	1	12	12	5	2	5	5	6	2	6	3	2	0

MONTHLY WIND CHART FOR DECEMBER. 1879.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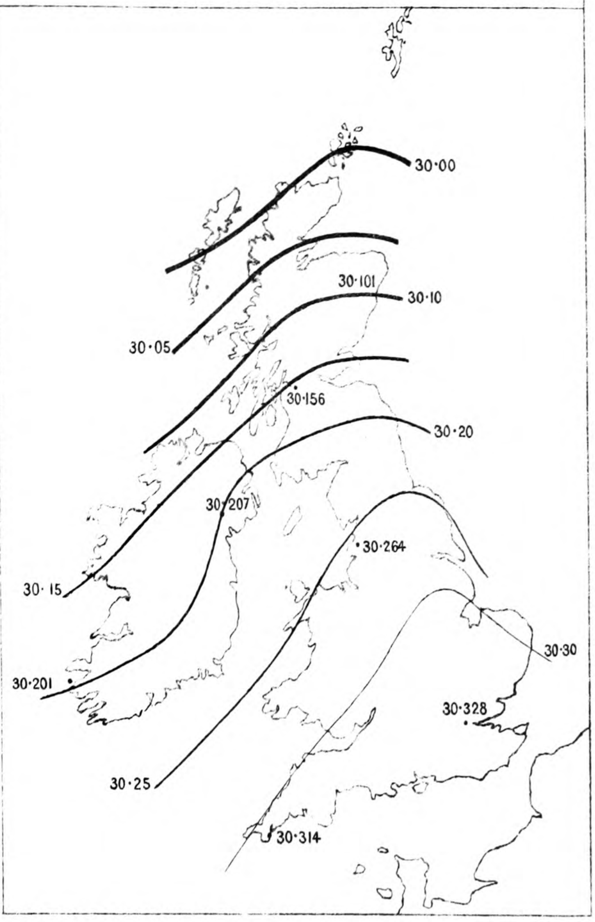
To face p. 146.

DANGERFIELD. LITH. 22. BEDFORD ST. COVENT GARDEN. 17640

MONTHLY WEATHER CHART. DECEMBER 1879.

1. DISTRIBUTION OF MEAN PRESSURE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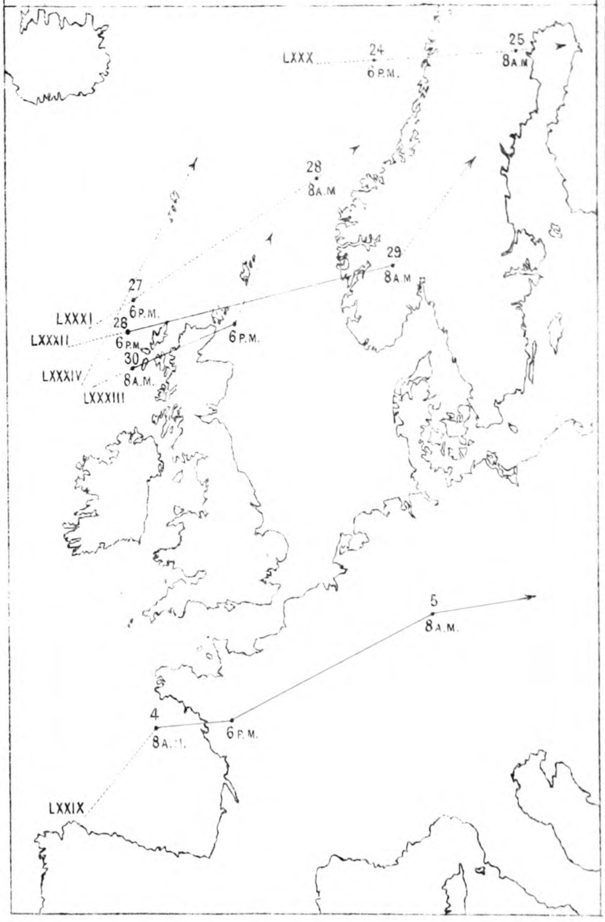
30·328
30·314

2. MOVEMENTS OF DEPRESSIONS.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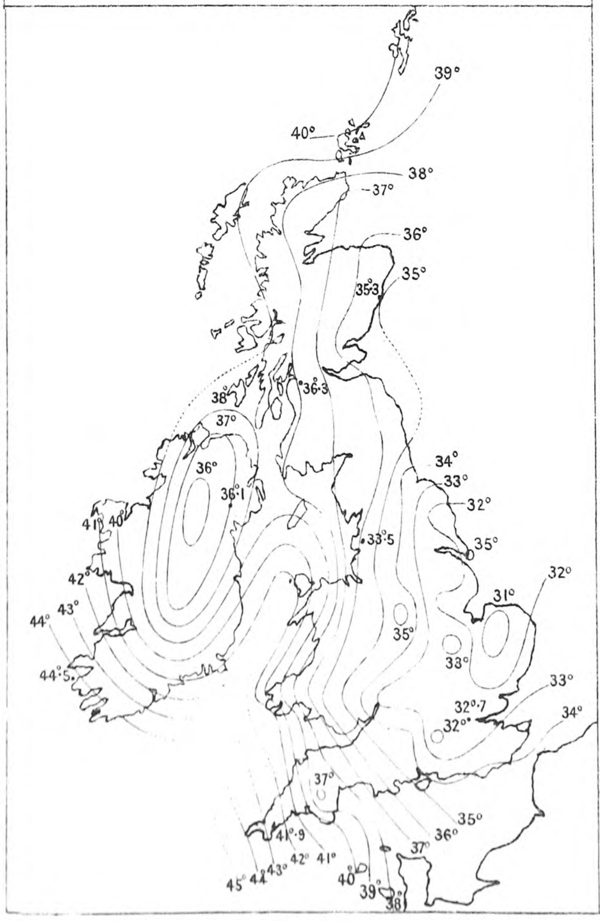
25 8 A.M.
28 8 A.M.
27 6 P.M.
LXXXI
28 6 P.M.
LXXXII
29 8 A.M.
6 P.M.
30 8 A.M.
LXXXIV
LXXXIII
5 8 A.M.
4 8 A.M.
6 P.M.
LXXIX

3. DISTRIBUTION OF MEAN TEMPERATURE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32°
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44°
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32°·7
32°
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34°
37°
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36°
41°·9
42°
41°
37°
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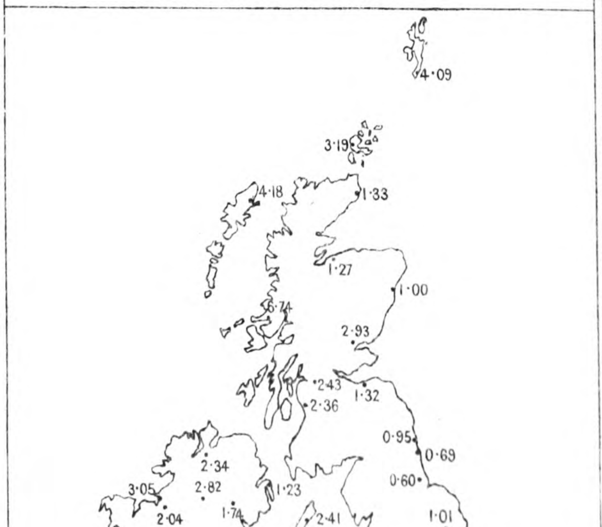
39°
38
45°
44
43°

4. RAINFALL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2·34
0·60
3·05
2·82
1·23
2·04
1·74
2·41
1·01
3·46
·56
0·86
0·46
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1·01
1·10
1·71
1·52
3·94
1·08
1·48
1·25
1·34
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0·71
0·95
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3·09
0·85
3·47
2·12
2·65
0·84
0·82
0·91
1·82
1·09
0·76
0·61
1·36
1·06
1·21
1·21
0·75
0·88
0·96
4·16
1·44
1·20
2·59
1·30
0·87

To follow Wind Chart for December.

Dangerfield Lith. 22, Bedford St Covent Garden. 17641

APPENDIX.

APPENDIX I.

TABLE I.—MEAN MONTHLY RESULTS from the continuous RECORDS at the SEVEN BRITISH OBSERVATORIES for the Year 1879.

VALENCIA.

1879. Months.	Thermometer.					Barometer.					Vapour Tension.
	Means.	Extremes.				Means.	Extremes.				
		Maximum.		Minimum.			Maximum.		Minimum.		
		Day.	Ther.	Day.	Ther.		Day.	Bar.	Day.	Bar.	
	°	D. H.	°	D. H.	°	ins.	D. H.	ins.	D. H.	ins.	in.
January - -	41·5	17th, 9 p.m.	52·4	**25th, 9 a.m.**	**28·6**	29·847	27th, 10 p.m.	30·533	8th, 5 a.m.	29·127	·221
February - -	43·6	9th, 1 p.m.	51·8	26th, 5 a.m.	31·2	·459	26th, 11 a.m.	·321	**11th, 1 a.m.**	**28·639**	·240
March - -	45·3	7th, 3 p.m.	55·7	27th, 7 a.m.	31·9	·906	7th, 11 a.m.	·491	28th, 6 p.m.	29·182	·248
April - -	46·5	24th, 3 p.m.	56·1	13th, 11 a.m.	32·1	29·659	29th, 10 a.m.	·366	7th, 4 a.m.	28·864	·259
May - - -	50·0	31st, 2 p.m.	59·1	10th, 5 a.m.	37·9	30·070	4th, Midnt.	·583	29th, 6 p.m. 7 p.m.	29·605	·282
June - - -	54·9	11th, 7 p.m.	66·1	2nd, 4 a.m.	41·9	29·651	13th, 8 a.m.	·127	30th, Midnt.	·128	·358
July - - -	55·5	30th, 7 p.m.	64·9	10th, Midnt. 11th, 0·25 a.m.	48·3	·828	22nd, 10 p.m. 11 p.m.	·132	1st, 1 a.m.	·116	·378
August - -	57·0	**8th, 4 p.m.**	**67·4**	2nd, 5 a.m.	47·9	·752	31st, Midnt.	·332	28th, 1 p.m. 2 p.m.	·171	·391
September - -	54·5	2nd, 3 p.m.	61·2	29th, 4 a.m.	45·5	*29·907	1st, 11 a.m.	·426	8th, 10 a.m.	†·283	·360
October - -	51·1	6th, 3 p.m.	63·6	26th, 7 a.m.	37·4	30·127	9th, 10 a.m.	·521	20th, 4 a.m.	·582	·325
November - -	46·5	19th, 1 p.m.	56·6	2nd, 8 a.m.	35·2	·284	**6th, 8 p.m.**	**·715**	23rd, 3 p.m.	·939	·253
December - -	44·5	28th, 3 p.m.	55·3	4th, 7 p.m.	29·4	30·175	13th, 3 a.m.	30·620	30th, 6 a.m.	29·538	·243
Annual - -	49·2	—	—	—	—	29·889	—	—	—	—	·297

* Means for three days are approximate.

† Lowest reading recorded, but trace lost for 10 hours on this day.

Table I.—Mean Monthly Results, &c.—*continued.*

ARMAGH.

1879. Months.	Thermometer.					Barometer.					Vapour Tension.
	Means.	Extremes.				Means.	Extremes.				
		Maximum.		Minimum.			Maximum.		Minimum.		
		Day.	Ther.	Day.	Ther.		Day.	Bar.	Day.	Bar.	
	°	D. H.	°	D. H.	°	ins.	D. H.	ins.	D. H.	ins.	in.
January - -	33·6	14th, 1 p.m.	48·1	12th, 4 a.m.	20·3	29·777	27th, 8 p.m.	30·344	15th, 4 a.m.	29·179	·162
February - -	38·0	27th, ?	*49·5	25th, 8 a.m.	26·9	·268	25th, Midnt. 26th, 3 a.m.	·074	**10th, 3 p.m.**	**28·612**	·204
March - -	40·0	8th, 2 p.m.	53·1	13th, 7 a.m.	28·5	·696	7th, 8 p.m.	·328	28th, Midnt.	·953	·211
April - -	42·6	5th, 2 p.m.	56·0	18th, 5 a.m.	30·4	·483	29th, 9 a.m. & 11 a.m.	·161	6th, 3 p.m.	28·733	·221
May - - -	47·6	29th, 1 p.m.	60·8	3rd, 5 a.m.	32·6	·816	5th, 1 a.m.	30·381	26th, 6 a.m.	29·352	·261
June - - -	54·1	15th, 3 p.m.	66·0	2nd, 2 a.m.	39·9	·468	13th, 11 a.m. 1,2,&4 p.m.	29·911	27th, 2 p.m.	29·086	·351
July - - -	55·0	29th, 3 p.m.	67·5	3rd, 4 a.m. 27th, 4 a.m.	48·0	†·528	22nd, 10 & 11 p.m. 23rd, 8 a.m.	29·841	1st, 6 p.m.	28·707	·378
August - -	55 8	**11th, 2 p.m.**	**72·3**	31st, 6 a.m.	44·2	·514	31st, Midnt.	30·070	28th, 7 p.m.	·683	·375
September - -	52·3	6th, 2 p.m.	65·7	24th, 5 a.m.	38·0	·639	1st, 11 a.m.	·172	8th, 10 p.m.	28·832	·341
October - -	47·3	5th, Noon	58·4	26th, 2 a.m. & 3 a.m.	32·7	29·904	8th, 11 a.m.	·351	19th, Midnt.	29·067	·294
November - -	42·3	18th, 2 p.m.	55·6	30th, 8 p.m. & Midnt.	29·0	30·075	7th, 11 a.m.	·438	11th, 5 p.m.	·528	·232
December - -	36·1	28th, 4 p.m.	53·7	**2nd, 8 a.m.**	**17·9**	29·969	**12th, 11 p.m.**	**30·468**	30th, 9 a.m.	29·032	·187
Annual - -	45·4	—	—	—	—	29·678	—	—	— .	—	·268

* Corrected reading of Phillip's maximum thermometer, obtained from Weather Sheet. † Mean for one day is approximate.

GLASGOW.

	°	D. H.	°	D. H.	°	ins.	D. H.	ins.	D. H.	ins.	in.
January - -	31·3	14th, 2 p.m.	45·2	12th, 7 a.m.	17·8	29·823	27th, 8 p.m.	30·288	1st, 1 a.m.	29·062	·141
February - -	35·0	7th, Noon	47·2	26th, 7 a.m.	23·4	·295	25th, 9 p.m.	·058	10th, 9 p.m.	28·656	·180
March - -	37·8	29th, 2 p.m.	51·1	14th, 7 a.m.	21·3	·693	7th, 11 p.m. 8th, 1 & 2 a.m.	·315	29th, 4 a.m.	·999	·189
April - -	41·2	26th, 4 p.m.	53·6	13th, 2 a.m.	30·3	·515	29th, 1 a.m.	·106	6th, 7 p.m.	28·752	·205
May - -	47·0	28th, 4 p.m.	60·7	2nd, 5 a.m	31·2	·779	4th, 10 p.m. & 11 p.m.	30·317	26th, 1 p.m.	29·280	·235
June - - -	53·5	14th, 3 p.m. & 4 p.m.	66·8	1st, 5 a.m.	39 0	·484	13th, 9 a.m.	29·923	27th, 5 p.m.	29·169	·321
July - - -	54·9	**22nd, 3 p.m.**	**71·5**	12th, 4 a.m.	46·5	·487	18th, 8 a.m.	29·818	2nd, 1 a.m. & 2 a.m.	28·753	·340
August - -	55·7	12th, 2 p.m.	71·2	10th, 4 a.m.	42·4	·489	31st, Midnt.	30·003	**28th, 10 p.m.**	**·584**	·363
September - -	51·8	7th, 3 p.m.	64·3	27th, 4 a.m.	35·8	·615	1st, 11 a.m.	·105	23rd, 4 a.m.	·834	·313
October - -	45·9	6th, 3 p.m.	58·9	28th, 7 a.m.	29·4	29·861	8th, 10 a.m.	·353	20th, 1 a.m. & 2 a.m.	28·786	·268
November - -	41·0	18th, 2 p.m.	55·3	14th, 9 a.m.	25·7	30·031	7th, 11 a.m.	·346	11th, 7 p.m.	29·233	·208
December - -	36·3	28th, 5 p.m.	53·3	**4th, 7 a.m.**	**13·5**	29·945	**12th, 11 p.m. 19th, 10 a.m.**	**30·459**	30th, 1 p.m.	28·875	·190
Annual - -	44·3	—	—	—	—	29·668	—	—	—	—	.246

Table I.—Mean Monthly Results, &c.—*continued.*

ABERDEEN.

1879. Months.	Thermometer.					Barometer.					Vapour Tension.
	Means.	Extremes.				Means.	Extremes.				
		Maximum.		Minimum.			Maximum.		Minimum.		
		Day.	Ther.	Day.	Ther.		Day.	Bar.	Day.	Bar.	
	°	D. H.	°	D. H.	°	ins.	D. H.	ins.	D. H.	ins.	in.
January - -	33·5	13th, 1 p.m.	42·0	3rd, 7 a.m.	18·1	29·957	29th, 7 p.m. & 8 p.m.	30·475	1st, 1 a.m.	29·013	·158
February - -	34·8	27th, Noon & 1 p.m.	48·3	20th, 8 a.m.	18·0	·434	25th, 8 p.m. & 9 p.m.	·179	6th, 2 p.m.	28·729	·168
March - -	37·5	4th, 4 p.m.	51·7	13th, 5 a.m.	26·1	·817	8th, 1 a.m.	·359	4th, 2 p.m.	29·178	·176
April - -	39·4	4th, 4 p.m.	51·5	19th, 6 a.m.	30·3	·676	29th, 1 p.m.	·226	6th, 11 p.m.	·044	·208
May - - -	*44·6	5th, Noon	62·8	7th; 2 a.m.	31·7	·885	4th, 9 p.m.	·393	26th, 4 p.m.	·409	·237
June - - -	50·5	20th, 7 p.m.	65·9	1st, 0·5 a.m.	40·0	·623	13th, 2 p.m.	30·080	22nd, 4 a.m.	29·297	·309
July - - -	53·2	**29th, 4 p.m.**	**69·4**	15th, Midnt.	44·3	·599	18th, 11 a.m.	29·956	2nd, 5 p.m.	28·828	·330
August - -	54·3	14th, 3 p.m.	68·0	27th, 4 a.m.	42·9	·602	3rd, 1 a.m.	30·074	29th, 1 a.m.	·756	·357
September - -	51·8	3rd, 4 p.m.	64·1	27th, 6 a.m.	34·3	·702	27th, 4 a.m.	·147	23rd, 10 a.m.	·927	·306
October - -	45·4	10th, 3 p.m.	60·4	27th, 7 a.m.	30·0	29·933	8th, 8, 9, & 10 a.m.	·462	20th, 2 a.m.	28·765	·251
November - -	41·2	17th, 2 p.m.	57·1	30th, 7 p.m.	26·5	30·100	25th, 6 p.m.	·473	11th, 9 p.m.	29·226	·206
December - -	35·3	23rd, 1 p.m.	52·6	**3rd, 4 a.m. 4th, 9 a.m.**	**14·6**	30·000	**19th, 8 p.m.**	**30·564**	**28th, 9 p.m**	**28·695**	·166
Annual - -	43·5	—	—	—	—	29·777	—		—	—	.239

* Mean for one day is approximate.

FALMOUTH.

	°	D. H.	°	D. H.	°	ins.	D. H.	ins.	D. H.	ins.	in.
January - -	39·1	1st, 5 p.m.	51·4	**12th, 2 a.m.**	**24·7**	29·715	27th, 10 p.m.	30·192	8th, 9 a.m.	29·008	·202
February - -	43·2	6th, 2 p.m.	52·3	25th, 7 a.m.	28·5	·312	26th, 8 p.m. & 9 p.m.	·044	10th, 11 a.m.	28·582	·245
March - -	43·9	20th, 3 p.m.	55·6	25th, 3 a.m.	32·0	·756	9th, Midnt.	·319	27th, 2 a.m. & 3 a.m.	29·172	·237
April - -	45·7	20th, 2 p.m. 26th, 1 p.m.	55·9	12th, 2 a.m. 13th, 6 a.m.	32·7	·460	29th, 1 p.m.	·163	**7th, 5 a.m.**	**28·554**	·249
May - - -	49·4	21st, 3 p.m.	59·4	2nd, 2 a.m.	37·0	·819	5th, 8 a.m.	30·302	28th, 4 a.m.	29·181	·276
June - - -	55·5	13th, 10 a.m.	63·9	4th, 3 a.m.	45·6	·565	13th, 1 p.m.	29·985	8th, 5 a.m.	·187	·378
July - - -	57·2	**18th, 1 p.m.**	**68·2**	5th, 4 a.m.	50·8	·656	24th, 10 p.m. & 11 p.m.	30·005	1st, 6 a.m. & 7 a.m.	·143	·397
August - -	58·5	13th, 1 p.m.	67·9	31st, Midnt.	48·9	·634	31st, Midnt.	·139	27th, 3 p.m.	·263	·420
September - -	55·8	18th, 1 p.m.	65·1	3rd, 6 a.m.	44·9	·762	1st, 11 p.m.	·274	7th, 9 a.m.	·173	·375
October - -	52·9	7th, 4 p.m.	60·4	16th, 2 a.m.	37·3	29·910	11th, 10 a.m.	·278	20th, 7 a.m.	·351	·333
November - -	44·3	19th, 11 a.m.	55·0	21st, 2 a.m.	31·0	30·027	6th, 11 a.m.	·463	21st, 5 p.m.	·571	·225
December - -	41·9	28th, 1 p.m. & 6 p.m.	52·5	5th, 0·15 a.m.	27·6	30·075	**22nd, 11 p.m.**	**30·563**	4th, 4 a.m.	29·162	·215
Annual - -	49·0	—	—	—	—	29·724	—	—	—	—	·296

Table I.—Mean Monthly Results, &c.—*continued.*

STONYHURST.

1879. Months.	Thermometer.					Barometer.					Vapour Tension.
	Means.	Extremes.				Means.	Extremes.				
		Maximum.		Minimum.			Maximum.		Minimum.		
		Day.	Ther.	Day.	Ther.		Day.	Bar.	Day.	Bar.	
	°	D. H.	°	D. H.	°	ins.	D. H.	ins.	D. H.	ins.	in.
January - -	30·6	14th, 2 p.m.	44·6	12th, 8 a.m.	18·6	29·644	27th, 8 p.m.	30·102	1st, 1 a.m.	29·033	·130
February - -	35·9	9th, 1 p.m.	48·9	23rd, 5 a.m.	25·2	·114	26th, 11 a.m.	29·809	**10th, 6 p.m. & 7 p.m.**	**28·405**	·181
March - -	39·1	19th, 2 p.m. & 3 p.m.	54·4	13th, 7 a.m.	26·9	·553	8th, 2 a.m.	30·198	29th, 4 a.m.	29·000	·191
April - -	41·0	7th, 2 p.m.	56·2	13th, 6 a.m.	28·0	·310	29th, 9 a.m.	29·946	7th, Noon	28·492	·199
May - -	47·1	21st, 3 p.m.	61·3	10th, 4 a.m.	31·0	·608	5th, 1 a.m.	30·135	31st, Midnt.	29·142	·244
June - -	54·2	14th, 5 p.m.	66·6	5th, 3 a.m.	38·3	·342	13th, 10 p.m. & 11 p.m.	29·755	21st, 7 p.m.	28·984	·335
July - -	55·7	29th, Noon	71·5	11th, 2 a.m.	45·1	·345	28th, 10 p.m.	·692	2nd, 1 a.m.	·663	·368
August - -	56·7	**12th, 3 p.m.**	**74·2**	8th, 11 p.m. 10th, 5 a.m.	44·8	·367	31st, Midnt.	29·890	28th, 9 p.m.	·808	·376
September - -	53·0	6th, 2 p.m. & 3 p.m. 7th, Noon	66·3	30th, 6 a.m.	35·4	·512	1st, Noon.	30·037	9th, 6 a.m.	†·815	·327
October - -	47·4	5th, 3 p.m.	60·5	16th, 4 a.m.	30·2	·710	8th, Midnt.	·155	20th, 4 a.m. & 5 a.m.	28·807	·284
November - -	39·7	18th, 2 p.m.	53·8	14th, 5 a.m. & 7 a.m.	26·5	·830	7th, 11 a.m.	·188	11th, 11 p.m.	29·186	·199
December - -	33·5	28th, 6 p.m.	52·7	**7th, 3 a.m.**	**12·9**	29·849	**12th, 11 p.m.**	**30·342**	30th, 1 p.m.	28·904	·166
Annual - -	44·5	--	—	—	—	29·515	--	—	—	—	·250

† Approximate reading.

KEW.

	°	D. H.	°	D. H.	°	ins.	D. H.	ins.	D. H.	ins.	in.
January - -	32·6	1st, 2 a.m.	51·3	12th, 7 a.m.	21·0	29·994	27th, 8 p.m.	30·417	3rd, 9 a.m.	29·310	·153
February - -	38·7	9th, 1 p.m.	52·5	24th, ?	*20·8	·508	1st, 1 a.m.	·142	**10th, 6 p.m.**	**28·797**	·208
March - -	41·3	19th, 2 p.m.	62·9	2nd, 7 a.m.	25·8	†·952	8th, 7 a.m.	·592	27th, 4 p.m.	29·527	·209
April - -	43·8	26th, 2 p.m.	60·0	12th, 1 a.m.	28·9	·657	29th, 1 p.m.	·299	7th, 7 a.m.	28·897	·228
May - -	48·7	21st, 6 p.m.	66·0	10th, 4 a.m.	31·2	·973	4th, 8 a.m.	·489	28th, 1 a.m.	29·505	·259
June - -	57·1	14th, 1 p.m.	69·7	4th, 4 a.m. 5th, 4 a.m.	43·0	·775	13th, 9 p.m. & 10 p.m.	·128	3rd, 6 a.m.	·369	·379
July - -	58·4	**29th, 2 p.m.**	**77·0**	11th, 3 a.m.	48·0	·768	28th, 10 & 11 a.m. & 1 p.m.	·141	20th, 8 p.m.	·265	·399
August - -	60·1	15th, 4 p.m.	74·7	31st, Midnt.	45·3	·806	31st, Midnt.	·295	27th, 6 p.m.	·428	·425
September - -	55·8	3rd, 4 p.m.	68·1	26th, 6 a.m.	40·3	29·936	1st, 9 p.m.	·459	24th, 5 a.m.	·259	·375
October - -	49·4	4th, 3 p.m.	64·4	26th, 4 a.m.	32·9	30·094	12th, 10 a.m.	·530	20th, 6 a.m.	·335	·305
November - -	38·8	18th, 2 p.m.	54·9	16th, 7 a.m.	‡21·9	·182	7th, Midnt. 8th, 1 a.m.	·603	12th, 1 a.m.	·709	·201
December - -	32·7	31st, 8 p.m.	53·9	**7th, 9 a.m.**	**§13·5**	30·288	**23rd, 3 a.m.**	**30·781**	4th, 8 p.m. & 11 p.m.	29·480	·167
Annual - -	46·5	—	—	—	—	29·911	—	—	—	—	·276

* Corrected reading of Minimum Thermometer, obtained from Weather Sheet. † Means for three days are approximate.
‡ Somewhat doubtful, trace faint. § Approximate reading.

TABLE II.—PART 1.

FIVE-DAY MEANS of the DRY BULB and WET BULB THERMOMETERS, and BAROMETER, from the continuous RECORDS at the SEVEN BRITISH OBSERVATORIES, January to June 1879.

Five-Day Periods.	THERMOMETERS.														BAROMETER.							Five-Day Periods.
	Valencia. 12 ft.		Armagh. 4 ft.		Glasgow. 7 ft.		Aberdeen. 41 ft.		Falmouth. 11 ft.		Stonyhurst. 7 ft.		Kew. 10 ft.		Valencia. 23 ft.	Armagh. 207 ft.	Glasgow. 184 ft.	Aberdeen. 88 ft.	Falmouth. 211 ft.	Stonyhurst. 381 ft.	Kew. 34 ft.	
	Dry	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.								
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	ins.	ins.	ins.	ins.	ins.	ins.	ins.	
Jan. 1–5	41·2	39·5	31·1	29·8	31·3	29·7	30·4	29·1	44·6	42·6	30·6	28·9	35·9	34·5	29·784	29·663	29·584	29·612	29·598	29·418	29 793	Jan. 1–5
,, 6–10	42·5	40·8	33·7	31·5	30·8	28·8	35·6	32·7	38·2	36·1	29·3	27·3	29·4	†27·4	·540	·602	·757	·963	·476	·558	·884	,, 6–10
,, 11–15	44·8	42·9	37·3	36·1	34·6	33·5	35·4	34·3	41·3	39·9	34·6	33·8	35·1	34·0	·691	·497	·505	29·627	·662	·397	29·872	,, 11–15
,, 16–20	45·8	44·0	37·1	35·5	31·4	29·9	35·2	33·2	42·8	40·8	31·9	29·9	32·3	31·4	29·791	·786	·903	30·081	·773	·748	30·120	,, 16–20
,, 21–25	35·9	(33·4)	30·0	28·6	27·6	26·3	30·8	28·9	32·3	*30·3	28·0	25·7	29·8	†27·8	30·018	29·927	29·970	·107	29·733	·731	29·980	,, 21–25
,, 26–30	38·4	36·4	32·7	(31·2)	31·5	30·2	33·6	32·1	35·3	33·7	29·3	27·5	33·3	31·7	30·260	30·140	30·163	30·294	30·022	·961	30·266	,, 26–30
Feb. 31–4	43·5	41·9	34·2	(32·9)	32·7	(31·5)	33·8	(32·3)	42·7	41·6	32·2	30·2	33·9	(32·3)	29·634	29·682	29·788	29·962	29·567	29·569	29·902	Feb. 31–4
,, 5–9	48·1	46·4	42·1	40·7	39·3	38·0	38·1	36·5	48·3	47·2	39·7	38·7	45·1	43·5	·249	·013	28·996	·086	·283	28·945	·501	,, 5–9
,, 10–14	46·6	45·0	40·7	39·8	36·4	35·4	36·7	35·1	46·8	45·7	38·6	37·3	44·3	42·8	·204	29·128	29·204	·383	·080	·978	·357	,, 10–14
,, 15–19	41·3	38·6	37·4	36·2	33·3	32·3	33·4	32·1	42·0	39·8	34·7	33·5	38·6	36·9	·255	28·946	28·983	·185	·110	28·811	·217	,, 15–19
,, 20–24	40·3	37·6	34·9	33·4	32·4	30·8	30·8	29·0	38·2	36·0	32·3	30·5	32·5	31·2	29·524	29·279	29·287	·391	·234	29·044	·389	,, 20–24
,, 25–1	41·3	39·2	37·6	36·2	35·8	34·3	35·8	33·5	39·8	(37·6)	36·6	(34·6)	36·7	*35·3	30·096	·822	·768	·835	·817	·597	29·923	,, 25–1
Mar. 2–6	46·6	44·5	43·7	41·9	42·2	40·4	41·4	38·7	44·2	42·3	41·7	39·5	41·6	39·5	29·956	29·603	29·490	29·505	29·911	·522	30·058	Mar. 2–6
,, 7–11	47·9	46·5	44·2	42·1	43·2	40·5	42·7	38·8	44 8	43 1	42·1	39·9	43·2	40·4	30·388	30·135	30·049	30·081	30·244	·979	30·411	,, 7–11
,, 12–16	47·5	45·4	39·8	38·1	32·3	30·7	31·3	(29·2)	44·1	41·4	37·2	(35·1)	41·7	(38·4)	29·989	29·743	29·743	29·884	29·863	·560	29·995	,, 12–16
,, 17–21	46·9	44·1	39·1	38·0	37·0	36·0	37·5	(36·5)	48·3	45 9	41·8	39·7	44·9	42·4	·803	·663	·698	29·869	·567	·486	·825	,, 17–21
,, 22–26	40·4	37·2	34·0	(31·7)	33·7	(31·0)	34·4	†30·8	37·5	35·1	32·6	*29·4	33·9	†31·7	·784	·748	·858	30·087	·513	·551	·759	,, 22–26
,, 27–31	43·1	40·6	39·7	37·7	38·6	(36·2)	38·0	36·1	45·0	42·6	39·5	36·7	42·9	40·5	·476	·257	·305	29·476	·418	·201	†·654	,, 27–31
Apr. 1–5	45·8	43·9	42·8	40·6	43·0	40·5	41·7	39·5	45·6	43·3	40·9	38·4	44·7	42·2	·611	·375	·355	·454	·482	·248	·661	April 1–5
,, 6–10	46·5	44·0	42·6	41·3	42·3	40·4	40·3	39·2	46·8	44·7	43·1	40·6	47·0	44·6	·357	·165	·238	·470	·127	·003	·349	,, 6–10
,, 11–15	40·9	37·8	38·6	35·7	37·4	34·4	37·1	34·9	38·5	35·5	35·8	32·8	37·9	35·2	·837	·666	·683	·836	·470	·423	·699	,, 11–15
,, 16–20	47·0	44·6	41·3	38·3	39·1	36·3	37·4	35·5	45·5	42·5	39·7	36·6	41·9	39·3	·556	·443	·500	·655	·443	·294	·642	,, 16–20
,, 21–25	49·8	47·5	43·8	41·6	41·3	38·6	39·6	38·0	49·3	47·2	41·4	38·9	45·0	42·7	·597	·429	·490	·659	·467	·284	·649	,, 21–25
,, 26–30	49·1	46·4	46·2	42·8	43·8	40·5	40·5	39·0	48·4	45·3	44·9	41·4	46·1	42·6	29·996	29·820	29·826	29·981	29·773	29·606	29·944	,, 26–30
May 1–5	48·5	44·4	46·2	41·7	45·8	41·1	(45·1)	40·9	46·7	42·2	44·6	40·1	44·4	39·7	30·405	30·228	30·191	30·291	30·162	30·013	30·340	May 1–5
,, 6–10	47·4	43·7	42·2	38·6	42·2	36·9	38·5	35·8	45·7	41·4	40·9	36·8	42·2	38·2	·176	29·891	29·818	29·882	29·849	29·632	29·972	,, 6–10
,, 11–15	50·9	47·6	48·4	45·4	48·0	43·7	45·6	42·6	50·2	47·0	46·1	42·5	48·2	45·0	30·131	·845	·789	·893	·899	·606	·992	,, 11–15
,, 16–20	51·3	48·8	49·6	47·9	47·7	45·1	43·7	42·0	50·6	48·6	50·2	46·8	50·6	47·6	29·918	·686	·715	·872	·713	·529	29·882	,, 16–20
,, 21–25	51·5	48·6	49·5	46·9	49·2	46·0	47·5	45·3	52·7	49·7	50·8	48·3	54·1	49·9	30·145	·833	·771	·863	·945	·652	30·055	,, 21–25
,, 26–30	49·6	47·0	49·0	46·7	48·5	45·3	47·0	45·4	50·1	47·7	48·9	46·0	51·7	48·9	29·727	·489	·467	·584	·415	·290	29·659	,, 26–30
June 31–4	51·8	48·3	49·4	46·5	48·7	44·8	45·7	43·0	52·4	50·2	49·0	(45·5)	52·5	50·4	·708	·474	·403	·499	·502	·246	·653	June 31–4
,, 5–9	54·3	52·4	53·1	51·2	50·5	47·9	46·4	44·9	54·4	52·8	53·6	50·6	57·4	54·6	·567	·443	·503	·710	·417	·304	29·693	,, 5–9
,, 10–14	55·7	52·6	55·0	53·1	54·7	51·4	48·6	47·5	55·9	53·7	55·0	52·2	57·5	54·4	·915	·765	·806	·963	·782	·622	30·008	,, 10–14
,, 15–19	56·5	54·8	56·1	54·0	55·8	52·6	50·9	49·3	56·7	55·0	56·8	53·6	59·1	56·4	·622	·449	·467	·610	·504	·298	29·695	,, 15–19
,, 20–24	54·4	51·7	55·1	52·2	*55·0	51·8	53·9	51·2	55·8	52·9	54·9	51·9	56·6	53·2	·585	·354	·368	·485	·559	·255	·747	,, 20–24
,, 25–29	56·1	53·4	55·4	52·7	54·7	51·7	54·7	51·8	57·0	54·6	55·2	52·2	58·1	54·9	29·506	29·297	29·319	29·441	29·569	29·271	29·782	,, 25–29

NOTE.—Means which are enclosed in brackets are a little doubtful, one of the five daily means being approximate only.

* Doubtful. Two of the five daily means are approximate.

† Doubtful. Three of the five daily means are approximate.

TABLE II.—PART 2.

FIVE-DAY MEANS of the DRY BULB and WET BULB THERMOMETERS, and BAROMETER, from the continuous RECORDS at the SEVEN BRITISH OBSERVATORIES, July to December 1879.

Five-Day Periods.	THERMOMETERS.														BAROMETER.							Five-Day Periods.
	Valencia. 12 ft.		Armagh. 4 ft.		Glasgow. 7 ft.		Aberdeen. 41 ft.		Falmouth. 11 ft.		Stonyhurst. 7 ft.		Kew. 10 ft.		Valencia. 23 ft.	Armagh. 207 ft.	Glasgow. 184 ft.	Aberdeen. 88 ft.	Falmouth. 211 ft.	Stonyhurst. 361 ft.	Kew. 34 ft.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.								
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	ins.	ins.	ins.	ins.	ins.	ins.	ins.	
June 30–4	54·1	51·2	53·2	50·9	52·4	49·5	53·9	50·0	55·5	52·7	53·5	50·7	56·0	53·0	29·609	29·218	29·142	29·213	29·497	29·103	29·626	June 30–4
July 5–9	54·8	52·6	53·2	51·4	54·1	50·6	53·7	50·5	56·4	53·5	53·5	51·0	56·6	53·2	·757	(·356)	·268	·350	·624	·180	·676	July 5–9
„ 10–14	54·7	52·4	53·8	51·7	52·7	48·7	50·8	47·8	55·5	53·6	53·8	51·0	56·5	53·6	·822	·563	·548	·683	·570	·311	·685	„ 10–14
„ 15–19	56·7	54·5	56·4	54·7	55·3	52·2	52·0	49·3	58·2	56·4	56·9	54·2	59·4	56·8	·827	·672	·698	·847	·674	·524	·878	„ 15–19
„ 20–24	55·4	53·4	55·4	53·5	57·8	53·9	52·7	50·9	57·4	54·7	55·6	53·3	58·6	55·6	·975	·611	·529	·650	·713	·327	29·709	„ 20–24
„ 25–29	57·3	55·9	57·8	56·0	57·4	54·4	56·6	53·0	58·6	56·4	58·7	55·7	60·5	57·4	·953	·711	·701	·792	·873	·610	30·039	„ 25–29
Aug. 30–3	55·8	52·9	54·8	52·4	55·1	51·6	54·8	51·8	59·2	57·2	58·5	55·2	63·5	60·1	·923	·725	·710	·824	·698	·543	29·912	Aug. 30–3
„ 4–8	56·6	54·6	54·9	52·6	54·7	52·1	54·2	52·2	57·7	55·6	54·3	52·4	59·0	56·2	·842	·571	·487	·579	·693	·362	·838	„ 4–8
„ 9–13	59·5	57·7	58·8	56·0	59·2	55·5	54·5	51·9	60·6	58·8	59·9	56·0	61·6	57·6	·761	·641	·679	·837	·682	·536	·912	„ 9–13
„ 14–18	57·1	54·4	56·2	53·7	56·3	53·5	54·5	53·1	57·6	55·2	57·7	54·9	60·5	57·5	·818	·572	·556	·708	·617	·347	·729	„ 14–18
„ 19–23	57·1	54·7	57·3	55·0	56·4	54·2	55·8	53·9	59·1	57·5	57·4	54·9	60·7	59·1	·573	·359	·367	·496	·483	·259	·710	„ 19–23
„ 24–28	57·2	54·5	55·2	53·0	55·3	52·3	53·8	51·3	58·7	56·4	56·3	53·4	59·4	56·7	29·526	·219	·193	·281	·547	·156	29·692	„ 24–28
Sept. 29–2	54·5	51·2	51·7	49·2	51·7	49·0	53·0	49·2	55·0	(51·3)	52·2	49·3	55·2	51·4	30·081	·763	·670	·694	·963	·630	30·106	Sept. 29–2
„ 3–7	56·5	55·3	55·2	(53·6)	54·9	52·0	53·7	51·0	57·2	55·3	56·9	(53·5)	57·6	55·3	29·778	·575	·609	·738	·679	·493	29·899	„ 3–7
„ 8–12	54·5	52·3	53·3	51·5	53·1	50·3	53·4	50·9	56·0	53·4	54·4	51·9	56·7	53·7	†·725	·357	·345	·441	·598	·238	·748	„ 8–12
„ 13–17	54·4	52·0	52·6	50·9	52·6	50·1	52·8	49·5	56·9	54·5	54·2	51·0	56·9	54·7	29·913	·703	·681	·768	·676	·523	·855	„ 13–17
„ 18–22	54·6	51·8	51·9	49·9	51·3	48·3	52·2	49·0	56·6	54·0	53·5	50·9	57·3	54·9	30·000	·714	·662	·740	·838	·558	·979	„ 18–22
„ 23–27	53·5	51·0	49·2	47·2	48·1	45·2	48·2	44·2	53·4	51·0	48·7	46·5	52·0	49·5	29·888	·602	·552	·624	·789	·483	·932	„ 23–27
Oct. 28–2	51·3	48·5	49·7	47·2	48·8	46·4	47·7	45·4	54·3	52·0	49·1	47·1	54·6	52·4	29·914	29·652	·633	29·738	29·778	·542	29·981	Oct. 28–2
„ 3–7	54·7	52·5	49·8	48·8	49·3	48·0	48·0	45·7	55·5	53·2	51·3	50·1	54·3	52·4	30·161	30·000	29·974	30·054	30·028	29·842	30·255	„ 3–7
„ 8–12	49·9	48·5	47·0	46·3	47·2	45·9	49·0	46·7	54·0	51·5	47·9	47·0	47·7	46·7	·474	·318	30·277	30·362	·230	30·104	·464	„ 8–12
„ 13–17	50·6	48·4	45·9	44·3	43·8	40·9	43·0	40·5	50·3	47·2	44·5	42·0	45·0	42·9	30·294	30·017	29·927	29·969	30·021	29·761	30·134	„ 13–17
„ 18–22	53·7	52·0	48·6	47·4	45·9	43·8	45·0	42·3	53·7	51·4	47·3	44·9	49·0	46·7	29·894	29·500	·383	·406	29·691	·283	29·738	„ 18–22
„ 23–27	48·6	46·4	46·2	45·1	44·8	43·6	43·5	41·9	52·4	50·5	47·0	45·6	50·1	48·4	29·886	29·702	29·702	29·798	·681	·543	29·921	„ 23–27
Nov. 28–1	48·6	45·9	44·3	42·6	42·3	39·8	41·8	39·1	49·3	46·3	43·7	41·2	47·7	44·7	30·215	30·098	30·109	30·196	29·895	29·875	30·143	Nov. 28–1
„ 2–6	46·5	43·8	44·5	42·7	42·4	40·2	45·3	41·9	45·9	42·4	43·9	41·0	43·1	40·8	·604	·337	30·223	·235	30·312	30·044	·404	„ 2–6
„ 7–11	50·1	47·0	45·9	43·9	45·5	43·4	44·5	41·7	49·7	46·4	45·1	43·2	44·9	43·3	·317	·047	29·964	·006	·147	29·863	·310	„ 7–11
„ 12–16	49·8	46·8	41·0	39·0	37·9	35·6	37·5	35·4	44·6	40·7	36·2	33·3	35·1	32·8	·230	·041	30·003	·055	30·096	·846	·222	„ 12–16
„ 17–21	49·5	47·4	47·7	46·4	46·2	44·4	46·2	43·7	45·4	43·3	44·4	42·8	41·0	39·4	·231	30·048	30·050	·170	29·977	·806	·120	„ 17–21
„ 22–26	42·0	39·5	38·3	36·8	38·5	35·6	38·8	36·2	41·3	39·0	34·0	(32·5)	33·2	(32·3)	·139	29·986	29·994	30·120	·818	·731	30·057	„ 22–26
Dec. 27–1	39·0	36·3	33·5	32·1	34·0	30·8	33·8	31·7	36·6	33·4	32·8	30·0	32·7	31·0	30·128	·933	·895	29·962	·769	·638	29·923	Dec. 27–1
„ 2–6	38·5	36·2	27·3	26·1	25·1	24·2	26·9	25·1	36·2	*33·1	23·8	22·1	26·8	25·3	29·773	29·620	29·617	29·692	29·519	29·429	29·771	„ 2–6
„ 7–11	41·5	39·2	29·1	28·3	33·0	32·0	31·3	29·3	40·9	37·7	29·8	28·7	29·1	(28·4)	30·435	30·274	30·250	30·326	30·304	30·096	30·500	„ 7–11
„ 12–16	48·4	45·8	39·6	37·9	40·5	39·3	39·1	37·1	42·7	39·8	36·3	35·4	34·9	34·3	·434	·241	·217	·237	·350	·126	·555	„ 12–16
„ 17–21	44·5	42·2	37·2	35·9	37·2	36·2	35·6	(34·3)	41·3	39·3	34·1	32·9	31·0	30·5	·348	·224	·260	·351	·228	·120	·507	„ 17–21
„ 22–26	46·9	44·9	41·6	39·6	41·7	39·8	40·3	37·6	43·5	41·4	36·2	35·0	32·6	32·3	30·330	30·118	30·088	30·122	30·294	30·057	30·536	„ 22–26
„ 27–31	48·7	46·6	43·6	42·1	41·4	39·7	39·8	37·2	48·3	46·6	41·5	40·1	42·5	40·6	29·770	29·374	29·281	29·311	29·839	29·339	29·968	„ 27–31

NOTE.—Means which are enclosed in brackets are a little doubtful, one of the five daily means being approximate.

* Doubtful. Two of the five daily means are approximate. † Doubtful. Three of the five daily means are approximate.

APPENDIX I. A.

TABLE I.—MEAN MONTHLY RESULTS from the continuous RECORDS at the SEVEN BRITISH OBSERVATORIES for the Year 1879. In millimetres and degrees centigrade.

VALENCIA.

1879. MONTHS.	THERMOMETER.					BAROMETER.					VAPOUR TENSION.
	Means.	Extremes.				Means.	Extremes.				
		Maximum.		Minimum.			Maximum.		Minimum.		
		Day.	Ther.	Day.	Ther.		Day.	Bar.	Day.	Bar.	
	° C.	D. H.	° C.	D. H.	° C.	mm.	D. H.	mm.	D. H.	mm.	mm.
January - -	5·28	17th, 9 p.m.	11·33	**25th, 9 a.m.**	**-1·89**	758·10	27th, 10 p.m.	775·53	8th, 5 a.m.	739·81	5·61
February - -	6·44	9th, 1 p.m.	11·00	26th, 5 a.m.	-0·44	48·25	26th, 11 a.m.	70·14	**11th, 1 a.m.**	**27·42**	6·09
March - -	7·39	7th, 3 p.m.	13·17	27th, 7 a.m.	-0·06	59·60	7th, 11 a.m.	74·46	28th, 6 p.m.	41·21	6·29
April - -	8·06	24th, 3 p.m.	13·39	13th, 11 a.m.	0·06	53·33	29th, 10 a.m.	71·28	7th, 4 a.m.	33·13	6·58
May - -	10·00	31st, 2 p.m.	15·06	10th, 5 a.m.	3·28	63·76	4th, Midnt.	76·80	29th, 6 p.m. & 7 p.m.	51·96	7·16
June - -	12·72	11th, 7 p.m.	18·94	2nd, 4 a.m.	5·50	53·13	13th, 8 a.m.	65·21	30th, Midt.	39·83	9·09
July - -	13·06	30th, 7 p.m.	18·28	10th, Midt. 11th, 0·25a.m.	9·06	57·61	22nd, 10p.m. & 11 p.m.	65·34	1st, 1 a.m.	39·53	9·59
August - -	13·89	**8th, 4 p.m.**	**19·67**	2nd, 5 a.m.	8·83	55·69	31st, Midnt.	70·42	28th, 1 p.m. & 2 p.m.	40·93	9·93
September -	12·50	2nd, 3 p.m.	16·22	29th, 4 a.m.	7·50	59·63*	1st, 11 a.m.	72·80	8th, 10 a.m.	43·78†	9·14
October - -	10·61	6th, 3 p.m.	17·56	26th, 7 a.m.	3·00	65·21	9th, 10 a.m.	75·22	20th, 4 a.m.	51·37	8·25
November -	8·06	19th, 1 p.m.	13·67	2nd, 8 a.m.	1·78	69·20	**6th, 8 p.m.**	**80·15**	23rd, 3 p.m.	60·44	6·43
December -	6·94	28th, 3 p.m.	12·94	4th, 7 p.m.	-1·44	766·43	13th, 3 a.m.	777·73	30th, 6 a.m.	750·25	6·17
Annual - -	9·58	—	—	—	—	759·16	—	—	—	—	7·53

* Means for three days are approximate. † Lowest reading recorded, but trace lost for ten hours on this day.

ARMAGH.

	° C.	D. H.	° C.	D. H.	° C	mm.	D. H.	mm.	D. H.	mm.	mm.
January - -	0·89	14th, 1 p.m.	8·94	12th, 4 a.m.	-6·50	756·32	27th, 8 p.m.	770·72	15th, 4 a.m.	741·13	4·11
February - -	3·33	27th, ?	9·72*	25th, 8 a.m.	-2·83	43·39	25th, Midt., 26th, 3 a.m.	63·86	**10th, 3 p.m.**	**26·73**	5·18
March - -	4·44	8th, 2 p.m.	11·72	13th, 7 a.m.	-1·94	54·26	7th, 8 p.m.	70·31	28th, Midnt.	35·40	5·36
April - -	5·89	5th, 2 p.m.	13·33	18th, 5 a.m.	-0·89	48·86	29th, 9 a.m. & 11 a.m.	66·08	6th, 3 p.m.	29·81	5·61
May - -	8·67	29th, 1 p.m.	16·00	3rd, 5 a.m.	0·33	57·31	5th, 1 a.m.	71·67	26th, 6 a.m.	45·53	6·63
June - -	12·28	15th, 3 p.m.	18·89	2nd, 2 a.m.	4·39	48·47	13th, 11a.m., 1, 2, & 4 p.m.	59·73	27th, 2 p.m.	38·77	8·92
July - -	12·78	29th, 3 p.m.	19·72	3rd, 4 a.m. & 27th, 4 a.m.	8·89	†49·99	22nd, 10p.m. & 11 p.m., 23rd, 8 a.m.	57·95	1st, 6 p.m.	29·15	9·59
August - -	13·22	**11th, 2 p.m.**	**22·39**	31st, 6 a.m.	6·78	49·64	31st, Midnt.	63·76	28th, 7 p.m.	28·54	9·52
September -	11·28	6th, 2 p.m.	18·72	24th, 5 a.m.	3·33	52·82	1st, 11 a.m.	66·35	8th, 10 p.m.	32·32	8·66
October - -	8·50	5th, Noon	14·67	26th, 2 a.m & 3 a.m.	0·39	59·55	8th, 11 a.m.	70·91	19th, Midnt.	38·29	7·46
November -	5·72	18th, 2 p.m.	13·11	30th, 8 p.m. & Midt.	-1·67	63·89	7th, 11 a.m.	73·11	11th, 5 p.m.	49·99	5·89
December -	2·28	28th, 4 p.m.	12·06	**2nd, 8 a.m.**	**-7·83**	761·20	**12th, 11 p.m.**	**773·87**	30th, 9 a.m.	37·40	4·75
Annual - -	7·44	—	—	—	—	753·81	—	-	—	—	6·81

* Corrected reading of Philips's Maximum Thermometer, obtained from Weather Sheet. † Mean for one day is approximate.

Table I.—Mean Monthly Results, &c.—*continued.*

GLASGOW.

1879. Months.	Thermometer.					Barometer.					Vapour Tension.
	Means.	Extremes.				Means.	Extremes.				
		Maximum.		Minimum.			Maximum.		Minimum.		
		Day.	Ther.	Day.	Ther.		Day.	Bar.	Day.	Bar.	
	° C.	D. H.	° C.	D. H.	° C.	mm.	D. H.	mm.	D. H.	mm.	mm.
January - -	−0·39	14th, 2 p.m.	7·33	12th, 7 a.m.	−7·89	757·49	27th, 8 p.m.	769·30	1st, 1 a.m.	738·16	3·58
February - -	1·67	7th, Noon	8·44	26th, 7 a.m.	−4·78	44·08	25th, 9 p.m.	63·46	10th, 9 p.m.	27·85	4·57
March - -	3·22	29th, 2 p.m.	10·61	14th, 7 a.m.	−5·94	54·19	7th, 11 p.m. 8th, 1 & 2 a.m.	69·99	29th, 4 a.m.	36·56	4·80
April - -	5·11	26th, 4 p.m.	12·00	13th, 2 a.m.	−0·94	49·67	29th, 1 a.m.	64·68	6th, 7 p.m.	30·29	5·21
May - -	8·33	28th, 4 p.m.	15·94	2nd, 5 a.m.	−0·44	56·37	4th, 10 p.m. & 11 p.m.	70·04	26th, 1 p.m.	43·70	5·97
June - -	11·94	14th, 3 p.m. & 4 p.m.	19·33	1st, 5 a.m.	3·89	48·88	13th, 9 a.m.	60·03	27th, 5 p.m.	40·88	8·15
July - -	12·72	**22nd, 3 p.m.**	**21·94**	12th, 4 a.m.	8·06	48·96	18th, 8 a.m.	57·36	2nd, 1 a.m. & 2 a.m.	30·32	8·63
August - -	13·17	12th, 2 p.m.	21·78	10th, 4 a.m.	5·78	49·01	31st, Midnt.	62·07	**28th, 10 p.m.**	**26·02**	9·22
September -	11·00	7th, 3 p.m.	17·94	27th, 4 a.m.	2·11	52·21	1st, 11 a.m.	64·66	23rd, 4 a.m.	32·37	7·95
October - -	7·72	6th, 3 p.m.	14·94	28th, 7 a.m.	−1·44	58·46	8th, 10 a.m.	70·96	20th, 1 a.m. & 2 a.m.	31·15	6·80
November -	5·00	18th, 2 p.m.	12·94	14th, 9 a.m.	−3·50	62·78	7th, 11 a.m.	70·77	11th, 7 p.m.	42·51	5·28
December -	2·39	28th, 5 p.m.	11·83	**4th, 7 a.m.**	**−10·28**	760·59	**12th, 11 p.m. 19th, 10 a.m.**	**773·65**	30th, 1 p.m.	733·41	4·82
Annual - -	6·82	—	—	—	—	753·56	—	—	—	—	6·25

ABERDEEN.

	° C.	D. H.	° C.	D. H.	° C.	mm.	D. H.	mm.	D. H.	mm.	mm.
January - -	0·83	13th, 1 p.m.	5·56	3rd, 7 a.m.	−7·72	760·90	29th, 7 p.m. & 8 p.m.	774·05	1st, 1 a.m.	736·92	4·01
February - -	1·56	27th, Noon & 1 p.m.	9·06	20th, 8 a.m.	−7·78	47·61	25th, 8 p.m. & 9 p.m.	66·53	6th, 2 p.m.	29·70	4·26
March - -	3·06	4th, 4 p.m.	10·94	13th, 5 a.m.	−3·28	57·34	8th, 1 a.m.	71·11	4th, 2 p.m.	41·10	4·46
April - -	4·11	4th, 4 p.m.	10·83	19th, 6 a.m.	−0·94	53·75	29th, 1 p.m.	67·72	6th, 11 p.m.	37·70	5·28
May - -	*7·00	5th, Noon.	17·11	7th, 2 a.m.	−0·17	59·07	4th, 9 p.m.	71·97	26th, 4 p.m.	46·98	6·02
June - -	10·28	20th, 7 p.m.	18·83	1st, 0·5 a.m.	4·44	52·41	13th, 2 p.m.	64·02	22nd, 4 a.m.	44·13	7·85
July - -	11·78	**29th, 4 p.m.**	**20·78**	15th, Midnt.	6·83	51·80	18th, 11 a.m.	60·87	2nd, 5 p.m.	32·21	8·38
August - -	12·39	14th, 3 p.m.	20·00	27th, 4 a.m.	6·06	51·88	3rd, 1 a.m.	63·86	29th, 1 a.m.	30·39	9·07
September -	11·00	3rd, 4 p.m.	17·83	27th, 6 a.m.	1·28	54·42	27th, 4 a.m.	65·72	23rd, 10 a.m.	34·73	7·77
October - -	7·44	10th, 3 p.m.	15·78	27th, 7 a.m.	−1·11	60·29	8th, 8, 9, & 10 a.m.	73·72	20th, 2 a.m.	30·62	6·38
November -	5·11	17th, 2 p.m.	13·94	30th, 7 p.m.	−3·06	64·53	25th, 6 p.m.	74·00	11th, 9 p.m.	42·32	5·23
December -	1·83	23rd, 1 p.m.	11·44	**3rd, 4 a.m. 4th, 9 a.m.**	**−9·67**	761·99	**19th, 8 p.m.**	**776·31**	**28th, 9 p.m.**	**728·84**	4·21
Annual - -	6·37	—	—	—	—	756·33	—	—	—	—	6·08

* Mean for one day is approximate.

Table I.—Mean Monthly Results, &c.—*continued.*

FALMOUTH.

1879. Months.	Thermometer.					Barometer.					Vapour Tension.
	Means.	Extremes.				Means.	Extremes.				
		Maximum.		Minimum.			Maximum.		Minimum.		
		Day.	Ther.	Day.	Ther.		Day.	Bar.	Day.	Bar.	
	° C.	D. H.	° C.	D. H.	° C.	mm.	D. H.	mm.	D. H.	mm.	mm.
January - -	3·94	1st, 5 p.m.	10·78	**12th 2 a.m.**	**–4·06**	754·75	27th, 10 p.m.	766·86	8th, 9 a.m.	736·79	5·13
February - -	6·22	6th, 2 p.m.	11·28	25th, 7 a.m.	–1·94	44·51	26th, 8 p.m. & 9 p.m.	63·10	10th, 11 a.m.	25·97	6·22
March - -	6·61	20th, 3 p.m.	13·11	25th, 3 a.m.	0·00	55·79	9th, Midnt.	70·09	27th, 2 a.m. & 3 a.m.	40·95	6·02
April - -	7·61	20th, 2 p.m. 26th, 1 p.m.	13·28	12th, 2 a.m. 13th, 6 a.m.	0·39	48·27	29th, 1 p.m.	66·13	**7th, 5 a.m.**	**25·26**	6·32
May - -	9·67	21st, 3 p.m.	15·22	2nd, 2 a.m.	2·78	57·39	5th, 8 a.m.	69·66	28th, 4 a.m.	41·19	7·00
June - -	13·06	13th, 10 a.m.	17·72	4th, 3 a.m.	7·56	50·94	13th, 1 p.m.	61·61	8th, 5 a.m.	41·34	9·59
July - -	14·00	**18th, 1 p.m.**	**20·11**	5th, 4 a.m.	10·44	53·25	24th, 10 p.m. & 11 p.m.	62·12	1st, 6 a.m. & 7 a.m.	40·22	10·08
August - -	14·72	13th, 1 p.m.	19·94	31st, Midnt.	9·39	52·69	31st, Midnt.	65·52	27th, 3 p.m.	43·27	10·66
September -	13·22	18th, 1 p.m.	18·39	3rd, 6 a.m.	7·17	55·94	1st, 11 p.m.	68·94	7th, 9 a.m.	40·98	9·52
October - -	11·61	7th, 4 p.m.	15·78	16th, 2 a.m.	2·94	59·70	11th, 10 a.m.	69·04	20th, 7 a.m.	45·51	8·46
November -	6·83	19th, 11 a.m.	12·78	21st, 2 a.m.	–0·56	62·67	6th, 11 a.m.	73·75	21st, 5 p.m.	51·09	5·71
December -	5·50	28th, 1 p.m. & 6 p.m.	11·39	5th, 0·15 a.m.	–2·44	763·89	**22nd, 11 p.m.**	**776·29**	4th, 4 a.m.	740·70	5·46
Annual - -	9·42	—	—	—	—	754·98	—	—	—	—	7·51

STONYHURST.

1879. Months.	Thermometer Means.	Max. Day.	Max. Ther.	Min. Day.	Min. Ther.	Barometer Means.	Max. Day.	Max. Bar.	Min. Day.	Min. Bar.	Vapour Tension.
	° C.	D. H.	° C.	D. H.	° C.	mm.	D. H.	mm.	D. H.	mm.	mm.
January - -	–0·78	14th, 2 p.m.	7·00	12th, 8 a.m.	– 7·44	752·94	27th, 8 p.m.	764·58	1st, 1 a.m.	737·43	3·30
February - -	2·17	9th, 1 p.m.	9·39	23rd, 5 a.m.	– 3·78	39·48	26th, 11 a.m.	57·14	**10th, 6 p.m. & 7 p.m.**	**21·48**	4·60
March - -	3·94	19th, 2 p.m. & 3 p.m.	12·44	13th, 7 a.m.	– 2·83	50·64	8th, 2 a.m.	67·01	29th, 4 a.m.	36·59	4·85
April - -	5·00	7th, 2 p.m.	13·44	13th, 6 a.m.	– 2·22	44·46	29th, 9 a.m.	60·61	7th, Noon	23·68	5·05
May - -	8·39	21st, 3 p.m.	16·28	10th, 4 a.m.	– 0·56	52·03	5th, 1 a.m.	65·42	31st, Midnt.	40·19	6·19
June - -	12·33	14th, 5 p.m.	19·22	5th, 3 a.m.	3·50	45·27	13th, 10 p.m. & 11 p.m.	55·77	21st, 7 p.m.	36·18	8·51
July - -	13·17	29th, Noon	21·94	11th, 2 a.m.	7·28	45·35	28th, 10 p.m.	54·16	2nd, 1 a.m.	28·03	9·34
August - -	13·72	**12th, 3 p.m.**	**23·44**	8th, 11 p.m. 10th, 5 a.m.	7·11	45·91	31st, Midnt.	59·19	28th, 9 p.m.	31·71	9·54
September -	11·67	6th, 2 p.m. & 3 p.m. 7th, Noon	19·06	30th, 6 a.m.	1·89	49·59	1st, Noon	62·93	9th, 6 a.m.	*31·89	8·30
October - -	8·56	5th, 3 p.m.	15·83	16th, 4 a.m.	– 1·00	54·62	8th, Midnt.	65·93	20th, 4 a.m. & 5 a.m.	31·69	7·21
November -	4·28	18th, 2 p.m.	12·11	14th, 5 a.m. & 7 a.m.	– 3·06	57·67	7th, 11 a.m.	66·76	11th, 11 p.m.	41·31	5·05
December -	0·83	28th, 6 p.m.	11·50	**7th, 3 a.m.**	**–10·61**	758·15	**12th, 11 p.m.**	**770·67**	30th, 1 p.m.	734·15	4·21
Annual - -	6·94	-	—	—	—	749·68	—	—	—	—	6·35

* Approximate reading.

Table I.—Mean Monthly Results, &c.—*continued.*

KEW.

1879. Months.	Thermometer.					Barometer.					Vapour Tension.
	Means.	Extremes.				Means.	Extremes.				
		Maximum.		Minimum.			Maximum.		Minimum.		
		Day.	Ther.	Day.	Ther.		Day.	Bar.	Day.	Bar.	
	° C.	D. H.	° C.	D. H.	° C.	mm.	D. H.	mm.	D. H.	mm.	mm.
January - -	0·33	1st, 2 a.m.	10·72	12th, 7 a.m.	− 6·11	761·83	27th, 8 p.m.	772·58	3rd, 9 a.m.	744·46	3·89
February - -	3·72	9th, 1 p.m.	11·39	24th, ?	−*6·22	49·49	1st, 1 a.m.	65·59	**10th, 6 p.m.**	**31·43**	5·28
March - -	5·17	19th, 2 p.m.	17·17	2nd, 7 a.m.	− 3·44	‡60·77	8th, 7 a.m.	77·02	27th, 4 p.m.	49·97	5·31
April - -	6·56	26th, 2 p.m.	15·56	12th, 1 a.m.	− 1·72	53·28	29th, 1 p.m.	69·58	7th, 7 a.m.	33·97	5·78
May - -	9·28	21st, 6 p.m.	18·89	10th, 4 a.m.	− 0·44	61·30	4th, 8 a.m.	74·41	28th, 1 a.m.	49·42	6·58
June - -	13·94	14th, 1 p.m.	20·94	4th, 4 a.m. 5th, 4 a.m.	6·11	56·27	13th, 9 p.m. & 10 p.m.	65·23	3rd, 6 a.m.	45·96	9·62
July - -	14·67	**29th, 2 p.m.**	**25·00**	11th, 3 a.m.	8·89	56·09	28th, 10 a.m. 11 a.m. & 1 p.m.	65·57	20th, 8 p.m.	43·32	10·13
August - -	15·61	15th, 4 p.m.	23·72	31st, Midnt.	7·39	57·06	31st, Midnt.	69·48	27th, 6 p.m.	47·45	10·79
September -	13·22	3rd, 4 p.m.	20·06	26th, 6 a.m.	4·61	60·36	1st, 9 p.m.	73·65	24th, 5 a.m.	43·17	9·52
October - -	9·67	4th, 3 p.m.	18·00	26th, 4 a.m.	0·50	64·37	12th, 10 a.m.	75·45	20th, 6 a.m.	45·10	7·75
November -	3·78	18th, 2 p.m.	12·72	16th, 7 a.m.	−§5·61	66·61	7th, Midnt. 8th, 1 a.m	77·31	12th, 1 a.m.	54·60	5·11
December -	0·39	31st, 8 p.m.	12·17	**7th, 9 a.m.**	− †10·28	769·30	**23rd, 3 a.m.**	**781·83**	4th, 8 p.m. & 11 p.m.	748·78	4·24
Annual - -	8·03	—	—	—	—	759·73	—	—	—	—	7·00

* Corrected reading of minimum thermometer, obtained from Weather Sheet. † Approximate reading.

‡ Means for three days are approximate. § Somewhat doubtful, trace faint.

TABLE II.—PART 1.

FIVE-DAY MEANS of the DRY BULB and WET BULB THERMOMETERS, and BAROMETER, from the continuous Records at the SEVEN BRITISH OBSERVATORIES, January to June 1879.

Five-Day Periods.	THERMOMETERS. Valencia. 3·66 m.		Armagh. 1·22 m.		Glasgow. 2·13 m.		Aberdeen. 12·50 m.		Falmouth. 3·35 m.		Stonyhurst. 2·13 m.		Kew. 3·05 m.		BAROMETER. Valencia. 7·01 m.	Armagh. 63·09 m.	Glasgow. 58·08 m.	Aberdeen. 26·82 m.	Falmouth. 64·31 m.	Stonyhurst. 110·03 m.	Kew. 10·36 m.	Five-Day Periods.
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.								
	° C.	° C.	° C.	° C.	° C.	° C.	° C.	° C.	° C.	° C.	° C.	° C.	° C.	° C.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	
Jan. 1–5	5·11	4·17	−0·50	−1·22	−0·39	−1·28	−0·89	−1·61	7·00	5·89	−0·78	−1·72	2·17	1·39	756·50	753·43	751·42	752·13	751·77	747·20	756·73	Jan. 1–5
,, 6–10	5·83	4·89	0·94	−0·28	−0·67	−1·78	2·00	0·39	3·44	2·28	−1·50	−2·61	−1·44	†−2·56	50·30	51·88	55·82	61·05	48·67	50·76	59·04	,, 6–10
,, 11–15	7·11	6·06	2·94	2·28	1·44	0·83	1·89	1·23	5·17	4·39	1·44	1·00	1·72	1·11	54·14	49·21	49·42	52·51	53·40	46·67	58·73	,, 11–15
,, 16–20	7·67	6·67	2·83	1·94	−0·33	−1·17	1·78	0·67	6·00	4·89	−0·06	−1·17	0·17	−0·33	56·68	56·55	59·53	64·05	56·22	55·58	65·03	,, 16–20
,, 21–25	2·17	(0·78)	−1·11	−1·89	−2·44	−3·17	−0·67	−1·72	0·17	−0·94*	−2·22	−3·50	−1·22	†−2·33	62·44	60·13	61·22	64·71	55·21	55·16	61·48	,, 21–25
,, 26–30	3·56	2·44	0·39	(−0·44)	−0·28	−1·00	0·89	0·06	1·83	0·94	−1·50	−2·50	0·72	−0·17	68·59	65·54	66·13	69·45	62·54	61·00	68·74	,, 26–30
Feb. 31–4	6·39	5·50	1·22	(0·50)	0·39	(−0·28)	1·00	(0·17)	5·94	5·33	0·11	−1·00	1·06	(0·17)	52·69	53·91	56·60	61·02	50·99	51·04	59·50	Feb. 31–4
,, 5–9	8·94	8·00	5·61	4·83	4·06	3·33	3·39	2·50	9·06	8·44	4·28	3·72	7·28	6·39	42·91	36·92	36·48	38·77	43·78	35·19	49·32	,, 5–9
,, 10–14	8·11	7·22	4·83	4·33	2·44	1·89	2·61	1·72	8·22	7·61	3·67	2·94	6·83	6·08	41·77	39·83	41·77	46·32	38·62	36·02	45·66	,, 10–14
,, 15–19	5·17	3·67	3·00	2·33	0·72	0·17	0·78	0·06	5·56	4·33	1·50	0·83	3·67	2·72	43·07	35·21	36·16	41·29	39·38	31·79	42·10	,, 15–19
,, 20–24	4·61	3·11	1·61	0·78	0·22	−0·67	−0·67	−1·67	3·44	2·22	0·17	−0·83	0·28	−0·44	49·89	43·67	43·88	46·52	42·53	37·70	46·47	,, 20–24
,, 25–1	5·17	4·00	3·11	2·33	2·11	1·28	2·11	0·83	4·33	(3·11)	2·56	(1·44)	2·61	*1·83	64·42	57·46	56·09	57·80	57·34	51·75	60·03	,, 25–1
Mar. 2–6	8·11	6·94	6·50	5·50	5·67	4·67	5·22	3·72	6·78	5·72	5·39	4·17	5·33	4·17	60·87	51·91	49·03	49·42	59·73	49·84	63·46	Mar. 2–6
,, 7–11	8·83	8·06	6·78	5·61	6·22	4·72	5·94	3·78	7·11	6·17	5·61	4·39	6·22	4·67	71·84	65·42	63·23	64·05	68·18	61·45	72·43	,, 7–11
,, 12–16	8·61	7·44	4·33	3·39	0·17	−0·72	−0·39	(−1·56)	6·72	5·22	2·89	(1·72)	5·39	(3·56)	61·71	55·46	55·46	59·04	58·51	50·81	61·86	,, 12–16
,, 17–21	8·28	6·72	3·94	3·33	2·78	2·22	3·06	(2·50)	9·06	7·72	5·44	4·28	7·17	5·78	56·99	53·43	54·31	58·66	50·99	48·93	57·54	,, 17–21
,, 22–26	4·67	2·89	1·11	(−0·17)	0·94	(−0·56)	1·33	†−0·67	3·06	1·72	0·33	*−1·44	1·06	†−0·17	56·50	55·58	58·38	64·20	49·62	50·59	55·87	,, 22–26
,, 27–31	6·17	4·78	4·28	3·17	3·67	(2·33)	3·33	2·28	7·22	5·89	4·17	2·61	6·06	4·72	48·67	43·12	44·34	48·67	47·20	41·70	†53·20	,, 27–31
April 1–5	7·67	6·61	6·00	4·78	6·11	4·72	5·39	4·17	7·56	6·28	4·94	3·56	7·06	5·67	52·11	46·11	45·61	48·12	48·83	42·88	53·38	April 1–5
,, 6–10	8·06	6·67	5·89	5·17	5·72	4·67	4·61	4·00	8·22	7·06	6·17	4·78	8·33	7·00	45·66	40·78	42·63	48·52	39·81	36·67	45·45	,, 6–10
,, 11–15	4·94	3·22	3·67	2·06	3·00	1·33	2·83	1·61	3·61	1·94	2·11	0·44	3·28	1·78	57·85	53·50	53·94	57·82	48·52	47·33	54·34	,, 11–15
,, 16–20	8·33	7·00	5·17	3·50	3·94	2·39	3·00	1·94	7·50	5·83	4·28	2·56	5·50	4·06	50·71	47·84	49·29	53·23	47·84	44·05	52·89	,, 16–20
,, 21–25	9·89	8·61	6·56	5·33	5·17	3·67	4·22	3·33	9·61	8·44	5·22	3·83	7·22	5·94	51·75	47·48	49·03	53·33	48·45	43·80	53·07	,, 21–25
,, 26–30	9·50	8·09	7·89	6·00	6·56	4·72	4·72	3·89	9·11	7·39	7·17	5·22	7·83	5·89	61·88	57·41	57·56	61·51	56·22	51·98	60·56	,, 26–30
May 1–5	9·17	6·89	7·89	5·39	7·67	5·06	(7·28)	4·94	8·17	5·67	7·00	4·50	6·89	4·28	72·28	67·77	66·84	69·38	66·10	62·32	70·62	May 1–5
,, 6–10	8·56	6·50	5·67	3·67	5·67	2·72	3·61	2·11	7·61	5·22	4·94	2·67	5·67	3·44	66·45	59·22	57·36	58·99	58·15	52·64	61·27	,, 6–10
,, 11–15	10·50	8·67	9·11	7·44	8·89	6·50	7·56	5·89	10·11	8·33	7·83	5·83	9·00	7·22	65·32	58·05	56·63	59·27	59·42	51·98	61·78	,, 11–15
,, 16–20	10·72	9·33	9·78	8·83	8·72	7·28	6·50	5·56	10·33	9·22	10·11	8·22	10·33	8·67	59·90	54·01	54·75	58·73	54·70	50·02	58·99	,, 16–20
,, 21–25	10·83	9·22	9·72	8·28	9·56	7·78	8·61	7·39	11·50	9·83	10·44	9·06	12·28	9·94	65·67	57·75	56·17	58·51	60·59	53·15	63·39	,, 21–25
,, 26–30	9·78	8·33	9·44	8·17	9·17	7·39	8·33	7·44	10·06	8·72	9·39	7·78	10·94	9·39	55·05	49·01	48·45	51·42	47·13	43·95	53·33	,, 26–30
June 31–4	11·00	9·06	9·67	8·06	9·28	7·11	7·61	6·11	11·33	10·11	9·44	(7·50)	11·39	10·22	54·57	48·62	46·83	49·26	49·34	42·83	53·18	June 31–4
,, 5–9	12·39	11·33	11·72	10·67	10·28	8·83	8·00	7·17	12·44	11·56	12·00	10·33	14·11	12·56	50·99	47·84	49·37	54·62	47·18	44·31	54·19	,, 5–9
,, 10–14	13·17	11·44	12·78	11·72	12·61	10·78	9·22	8·61	13·28	12·06	12·78	11·22	14·17	12·44	59·83	56·02	57·06	61·05	56·45	52·38	62·19	,, 10–14
,, 15–19	13·61	12·67	13·59	12·22	13·22	11·44	10·50	9·61	13·72	12·78	13·78	12·00	15·06	13·56	52·38	47·99	48·45	52·08	49·39	44·15	54·24	,, 15–19
,, 20–24	12·44	10·94	12·83	11·22	12·78	11·00	12·17	10·67	13·22	11·61	12·72	11·06	13·67	11·78	51·45	45·58	45·93	48·91	50·79	43·07	55·56	,, 20–24
,, 25–29	13·39	11·89	13·00	11·50	12·61	10·94	12·61	11·00	13·89	12·56	12·89	11·22	14·50	12·72	749·44	744·13	744·69	747·79	751·04	743·47	756·45	,, 25–29

NOTE.—Means which are enclosed in brackets are a little doubtful, one of the five daily means being approximate.

* Doubtful. Two of the five daily means are approximate only. † Doubtful. Three of the five daily means are approximate only.

TABLE II.—PART 2.

FIVE-DAY MEANS of the DRY BULB and WET BULB THERMOMETERS, and BAROMETER, from the continuous RECORDS at the SEVEN BRITISH OBSERVATORIES, July to December 1879.

Five-Day Periods.	THERMOMETERS.														BAROMETER.							Five-Day Periods.
	Valencia. 3·66 m.		Armagh. 1·22 m.		Glasgow. 2·13 m.		Aberdeen. 12·50 m.		Falmouth. 3·35 m.		Stonyhurst. 2·13 m.		Kew. 3·05 m.		Valencia. 7·01 m.	Armagh. 63·09 m.	Glasgow. 56·08 m.	Aberdeen. 26·82 m.	Falmouth. 64·31 m.	Stonyhurst. 110·03 m.	Kew. 10·36 m.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.								
	° C.	° C.	° C.	° C.	° C.	° C.	° C.	° C.	° C.	° C.	° C.	° C.	° C.	° C.	mm.	mm.	mm.	mm.	mm.	mm.	mm	
June 30–4	12·28	10·67	11·78	10·50	11·33	9·72	12·17	10·00	13·06	11·50	11·94	10·39	13·33	11·67	752·06	742·12	740·19	742·00	749·21	739·21	752·48	June 30–4
July 5–9	12·67	11·44	11·78	10·78	12·28	10·33	12·06	10·28	13·56	11·94	11·94	10·56	13·67	11·78	55·82	(45·63)	43·39	45·48	52·43	41·16	53·75	July 5–9
,, 10–14	12·61	11·33	12·11	10·94	11·50	9·28	10·44	8·78	13·06	12·00	12·11	10·56	13·61	12·00	57·46	50·89	50·50	53·94	51·06	44·49	53·99	,, 10–14
,, 15–19	13·72	12·50	13·56	12·61	12·94	11·22	11·11	9·61	14·56	13·56	13·83	12·33	15·22	13·78	57·59	53·65	54·31	58·10	53·70	49·89	58·88	,, 15–19
,, 20–24	13·00	11·89	13·00	11·94	14·33	12·17	11·50	10·50	14·11	12·61	13·11	11·83	14·78	13·11	61·35	52·11	50·02	53·10	54·70	44·89	54·60	,, 20–24
,, 25–29	14·06	13·28	14·33	13·33	14·11	12·44	13·67	11·67	14·78	13·56	14·83	13·17	15·83	14·11	60·80	54·65	54·40	56·70	58·76	52·08	62·98	,, 25–29
Aug. 30–3	13·22	11·61	12·67	11·33	12·83	10·89	12·67	11·00	15·11	14·00	14·72	12·89	17·50	15·61	60·03	55·00	54·62	57·51	54·31	50·38	59·75	Aug. 30–3
,, 4–8	13·67	12·56	12·72	11·44	12·61	11·17	12·33	11·22	14·28	13·11	12·39	11·33	15·00	13·44	57·97	51·09	48·96	51·29	54·19	45·78	57·87	,, 4–8
,, 9–13	15·28	14·28	14·89	13·33	15·11	13·06	12·50	11·06	15·89	14·89	15·50	13·33	16·44	14·22	55·92	52·87	53·83	57·85	53·91	50·20	59·75	,, 9–13
,, 14–18	13·94	12·44	13·44	12·06	13·50	11·94	12·50	11·72	14·22	12·89	14·28	12·72	15·83	14·17	57·36	51·11	50·71	54·57	52·26	45·40	55·10	,, 14–18
,, 19–23	13·94	12·61	14·06	12·78	13·56	12·33	13·22	12·17	15·06	14·17	14·11	12·72	15·94	15·06	51·14	45·71	45·91	49·18	48·86	43·17	54·62	,, 19–23
,, 24–28	14·00	12·50	12·89	11·67	12·94	11·28	12·11	10·72	14·83	13·56	13·50	11·89	15·22	13·72	49·94	42·15	41·49	43·73	50·48	40·55	54·16	,, 24–28
Sept. 29–2	12·50	10·67	10·94	9·56	10·94	9·44	11·67	9·56	12·78	(10·72)	11·22	9·61	12·89	10·78	64·05	55·97	53·60	54·21	61·05	52·59	64·68	Sept. 29–2
,, 3–7	13·61	12·94	12·89	(12·00)	12·72	11·11	12·06	10·56	14·00	12·94	13·83	(11·94)	14·22	12·94	56·34	51·19	52·06	55·33	53·83	49·11	59·42	,, 3–7
,, 8–12	12·50	11·28	11·83	10·83	11·72	10·17	11·89	10·50	13·33	11·89	12·44	11·06	13·72	12·06	†55·00	45·66	45·35	47·79	51·77	42·63	55·58	,, 8–12
,, 13–17	12·44	11·11	11·44	10·50	11·44	10·06	11·56	9·72	13·83	12·50	12·33	10·56	13·83	12·61	59·78	54·45	53·89	56·09	53·75	49·87	58·31	,, 13–17
,, 18–22	12·56	11·00	11·06	9·94	10·72	9·06	11·22	9·44	13·67	12·22	11·94	10·50	14·06	12·72	61·99	54·72	53·40	55·38	57·87	50·76	61·45	,, 18–22
,, 23–27	11·94	10·56	9·56	8·44	8·94	7·33	9·00	6·78	11·89	10·56	9·28	8·06	11·11	9·72	59·14	51·88	50·61	52·43	56·63	48·86	60·26	,, 23–27
Oct. 28–2	10·72	9·17	9·83	8·44	9·33	8·00	8·72	7·44	12·39	11·11	9·50	8·39	12·56	11·33	59·80	53·15	52·67	55·33	56·34	50·35	61·51	Oct. 28–2
,, 3–7	12·61	11·39	9·89	9·33	9·61	8·89	8·89	7·61	13·06	11·78	10·72	10·06	12·39	11·33	66·08	61·99	61·32	63·36	62·69	57·97	68·47	,, 3–7
,, 8–12	9·94	9·17	8·33	7·94	8·44	7·72	9·44	8·17	12·22	10·83	8·83	8·33	8·72	8·17	74·02	70·06	69·02	71·18	67·83	64·63	73·77	,, 8–12
,, 13–17	10·33	9·11	7·72	6·83	6·56	4·94	6·11	4·72	10·17	8·44	6·94	5·56	7·22	6·06	69·45	62·42	60·13	61·20	62·52	55·92	65·39	,, 13–17
,, 18–22	12·06	11·11	9·22	8·56	7·72	6·56	7·22	5·72	12·06	10·78	8·50	7·17	9·44	8·17	59·29	49·29	46·32	46·90	54·14	43·78	55·33	,, 18–22
,, 23–27	9·22	8·00	7·89	7·28	7·11	6·44	6·39	5·50	11·33	10·28	8·33	7·56	10·06	9·11	59·09	54·42	54·42	56·85	53·89	50·38	59·98	,, 23–27
Nov. 28–1	9·22	7·72	6·83	5·89	5·72	4·33	5·44	3·94	9·61	7·94	6·50	5·11	8·72	7·06	67·45	64·47	64·76	66·96	59·32	58·81	65·62	Nov. 28–1
,, 2–6	8·06	6·56	6·94	5·94	5·78	4·56	7·39	5·50	7·72	5·78	6·61	5·00	6·17	4·89	77·33	70·55	67·65	67·96	69·91	63·10	72·25	,, 2–6
,, 7–11	10·06	8·33	7·72	6·61	7·50	6·33	6·94	5·39	9·83	8·00	7·28	6·22	7·17	6·28	70·04	63·18	61·07	62·14	65·72	58·51	69·86	,, 7–11
,, 12–16	9·89	8·22	5·00	3·89	3·28	2·00	3·06	1·89	7·00	4·83	2·33	0·72	1·72	0·44	67·83	63·03	62·07	63·39	64·42	58·07	67·62	,, 12–16
,, 17–21	9·72	8·56	8·72	8·00	7·89	6·89	7·89	6·50	7·44	6·28	6·89	6·00	5·00	4·11	67·86	63·20	63·26	66·30	61·40	57·06	65·03	,, 17–21
,, 22–26	5·56	4·17	3·50	2·67	3·61	2·00	3·78	2·33	5·17	3·89	1·11	(0·28)	0·67	(0·17)	65·52	61·63	61·83	65·03	57·36	55·16	63·44	,, 22–26
Dec. 27–1	3·89	2·39	0·83	0·06	1·11	−0·67	1·00	−0·17	2·56	0·78	0·44	−1·11	0·39	−0·56	65·23	60·29	59·32	61·02	56·12	52·79	60·03	Dec. 27–1
,, 2–6	3·61	2·33	−2·61	−3·28	−3·83	−4·33	−2·83	−3·83	2·33	*0·61	−4·56	−5·50	−2·89	−3·72	56·22	52·33	52·26	54·16	49·77	47·48	56·17	,, 2–6
,, 7–11	5·28	4·00	−1·61	−2·06	0·56	0·00	−0·39	−1·50	4·94	3·17	−1·22	−1·83	−1·61	(−2·00)	73·04	68·94	68·34	70·26	69·71	64·42	74·69	,, 7–11
,, 12–16	9·11	7·67	4·22	3·28	4·72	4·06	3·94	2·83	5·94	4·33	2·39	1·89	1·61	1·28	73·01	68·11	67·50	68·01	70·88	65·18	76·09	,, 12–16
,, 17–21	6·94	5·67	2·89	2·17	2·89	2·33	2·00	(1·28)	5·17	4·06	1·17	0·50	−0·56	−0·83	70·82	67·67	68·59	70·91	67·77	65·03	74·87	,, 17–21
,, 22–26	8·28	7·17	5·33	4·22	5·39	4·33	4·61	3·11	6·39	5·22	2·33	1·67	0·33	0·17	70·37	64·98	64·22	65·08	69·45	63·44	75·60	,, 22–26
,, 27–31	9·28	8·11	6·44	5·61	5·22	4·28	4·33	2·89	9·06	8·11	5·28	4·50	5·83	4·78	756·14	746·08	743·73	744·49	757·90	745·20	761·17	,, 27–31

NOTE.—Means which are enclosed in brackets are a little doubtful, one of the five daily means being approximate.

* Doubtful. Two of the five daily means are approximate. † Doubtful. Three of the five daily means are approximate.

APPENDIX II.

REPORT ON EXPERIMENTS MADE AT STRATHFIELD TURGISS IN 1869 WITH STANDS OR SCREENS OF VARIOUS PATTERNS, DEVISED AND EMPLOYED FOR THE EXPOSING OF THERMOMETERS, IN ORDER TO DETERMINE THE TEMPERATURE OF THE AIR.

PART I.—DESCRIPTION OF STANDS AND INSTRUMENTS.

It would appear at first sight unnecessary to state in a paper like this that the thermometer, from the time of its invention till the present day, has been applied in an increasing degree to the determination, both of the absolute and relative temperature of the air in different localities; but it is very necessary to say that the question of exposing thermometers when used for observing the temperature of the air, so as at once to secure for them free access of air and due protection from radiation, rain, &c., received until comparatively recent times very inadequate attention from the majority of meteorological observers, while it is likely that in the various stands constructed by persons who in any degree appreciated the importance of the matter, causes of error have been introduced such as render not sufficiently intercomparable the observations made with thermometers suspended in different stands. It is not improbable also that not a few of the abrupt differences of temperature recorded simultaneously at neighbouring places are traceable to the same cause.

It was with the view of ascertaining which among the various stands used in late years was on the whole the best, as well as the corrections applicable to the observations made in each stand so as to render the observations in all the stands intercomparable, that Mr. Symons, with the concurrence of several meteorologists, applied to the Royal Society in 1868 for funds to defray the cost of the experiments which he proposed to institute.

A sum of 15*l.* was immediately granted, and a further sum of 30*l.* in the following year. An excellent locality was provided on the grounds of the Rectory of Strathfield Turgiss in Hampshire, by the Rector, the Rev. C. H. Griffith, F.M.S., who himself kindly undertook the laborious task of conducting the observations, consisting of readings of all the instruments at 9 a.m., 3 p.m., and 9 p.m., from November 1868 to April 1870 inclusive, broken only by an absence of one month in January 1870.

A large number of excellent thermometers were kindly lent by Mr. Casella for exposure in the various stands, and these were carefully tested at the Kew Observatory and their corrections ascertained.

Some account must be given of the site on which the experiments were conducted. Strathfield Turgiss Rectory is in the extreme N. of Hampshire, in Lat. 51° 20′ 23″ N., Long. 1° 0′ 30″ W., the grounds are nearly level, free from large trees except on their confines, about 200 feet above mean sea level, and half a mile from the nearest water (the little river Lodden). The accompanying ground plan shows as much of the Rectory grounds as in any way bear upon the results. The shaded space marked "thermometer enclosure," and in which most of the stands were erected, was a parallelogram separated from the rest of the pasture field merely by a post and rail-fence. It measured 140 feet from E. to W., and 20 feet from N. to S.

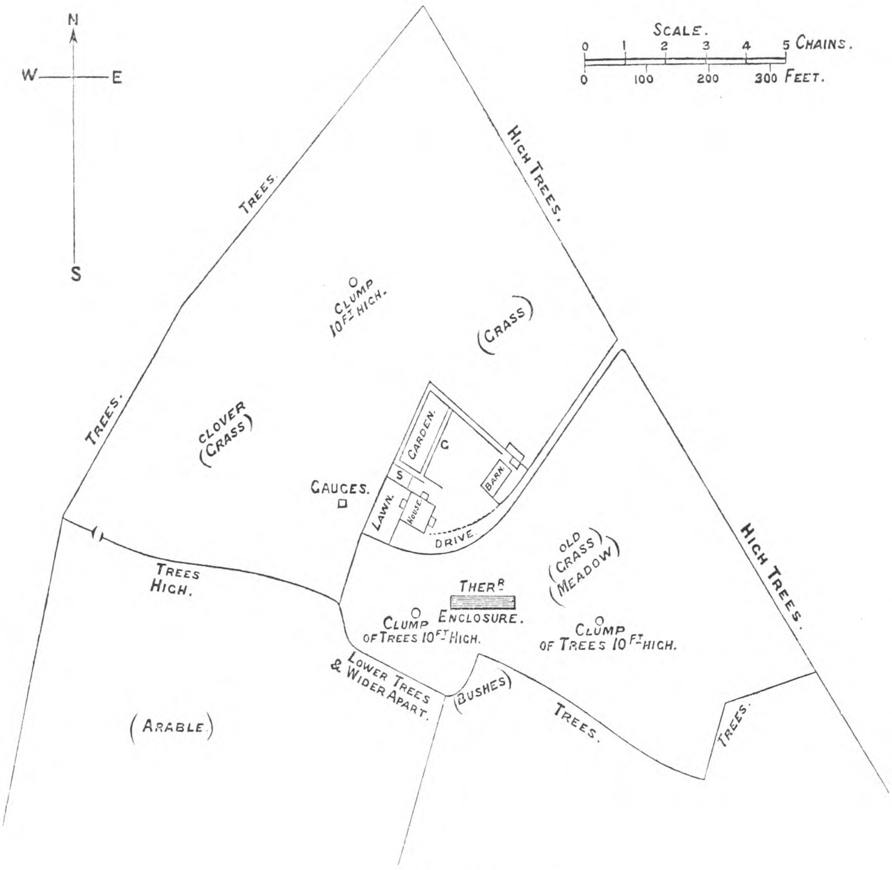
N
W
E
S
SCALE.
0 1 2 3 4 5 CHAINS.
0 100 200 300 FEET.
TREES
HIGH TREES.
CLUMP 10FT HIGH.
(GRASS)
TREES.
CLOVER (GRASS)
GARDEN.
C
S
BARN
LAWN.
HOUSE
GAUGES.
DRIVE
OLD (GRASS) (MEADOW)
HIGH TREES.
TREES HIGH.
THERR ENCLOSURE.
CLUMP OF TREES 10FT HIGH.
CLUMP OF TREES 10FT HIGH.
LOWER TREES & WIDER APART.
(BUSHES)
TREES.
TREES.
(ARABLE)

FIG. 1.

The positions of the various stands within the enclosure will be found in an illustration given on p. [24].

The following are the forms of stands which have been compared:—

I. *James's Stand.*—This is almost the same as (and evidently copied from) Glaisher's Greenwich stand (No. VI.). The differences are (1) that the thermometers are hung upon a frame attached to the front of the stand (B. Figs. 2 and 2*a.*) instead of being fixed with their bulbs below it, as in Glaisher's, and (2) that the pent-house roof is less steep and rather broader than in Glaisher's. It is the pattern recommended by Colonel (afterwards Major-General) Sir H. James, R.E., F.R.S., in his "Instructions for taking Meteorological Observations, with Tables, 1860."

In the above sketches the thermometers are shown as duplicate pairs of maximum and minimum instruments, the bulbs of one pair being moistened (as wet bulbs), the others left dry. This arrangement, recommended by Colonel James, was not adhered to in the experiments now under discussion, an ordinary Mason's Hygrometer and pair of maximum and minimum thermometers having been mounted on it, the same as on the other stands, to insure uniformity. A is a flat vertical board, carrying the frame B, on which are mounted the thermometers; C C′ are two sloping boards, of the same width as the front board A, but inclined to it at an angle of about 45°. They are separated about 3 inches from each other by means of blocks of wood, and from a roof which is kept turned towards the sun in order to keep his rays off the back of the upright board A. D is a pent-house roof, overlapping the thermometer and intending to keep off the rain, as well as to prevent radiation from the instruments and the front of the stand during clear weather. This front roof is rather broader than in the Glaisher Stand (No. VI.). The stand was turned three times daily (9 a.m., 3 p.m., and 9 p.m.), so that the sloping back might be kept presented to the sun.

JAMES'S STAND.

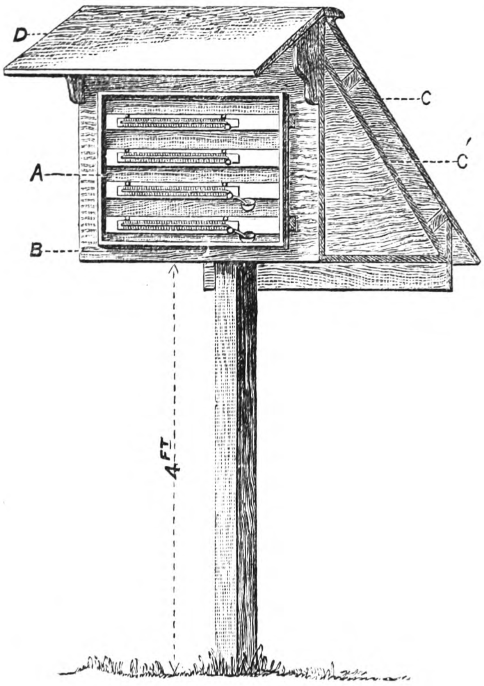

Fig. 2.

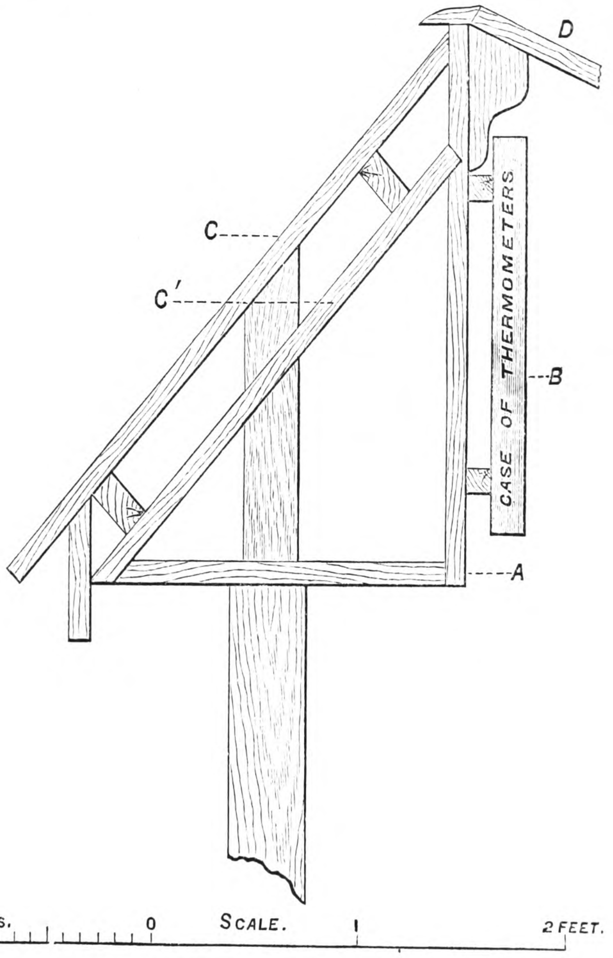

Fig. 2a.

II. *Lawson's.*—The late H. Lawson, F.R.S., of Bath, was among the earliest to recognise the importance of absolute uniformity in meteorological arrangements, and in his privately printed and

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(Note.)—No importance is to be attached to the sequence in which the stands are described, inasmuch as the precise date when the various patterns were first constructed is not known, their form was so various as to render classification very difficult before the experiments were made, and they are therefore mentioned merely in the order in which they were first arranged and printed in the observation sheets.

scarce work on the "The arrangement of an Observatory for Practical Astronomy and Meteorology," he gives the plan and dimensions of a stand which he thought might be placed upon a gentleman's lawn and would give truthful and comparable results. From these dimensions the specimen stand was constructed.

LAWSON'S STAND.

FIG. 3A.

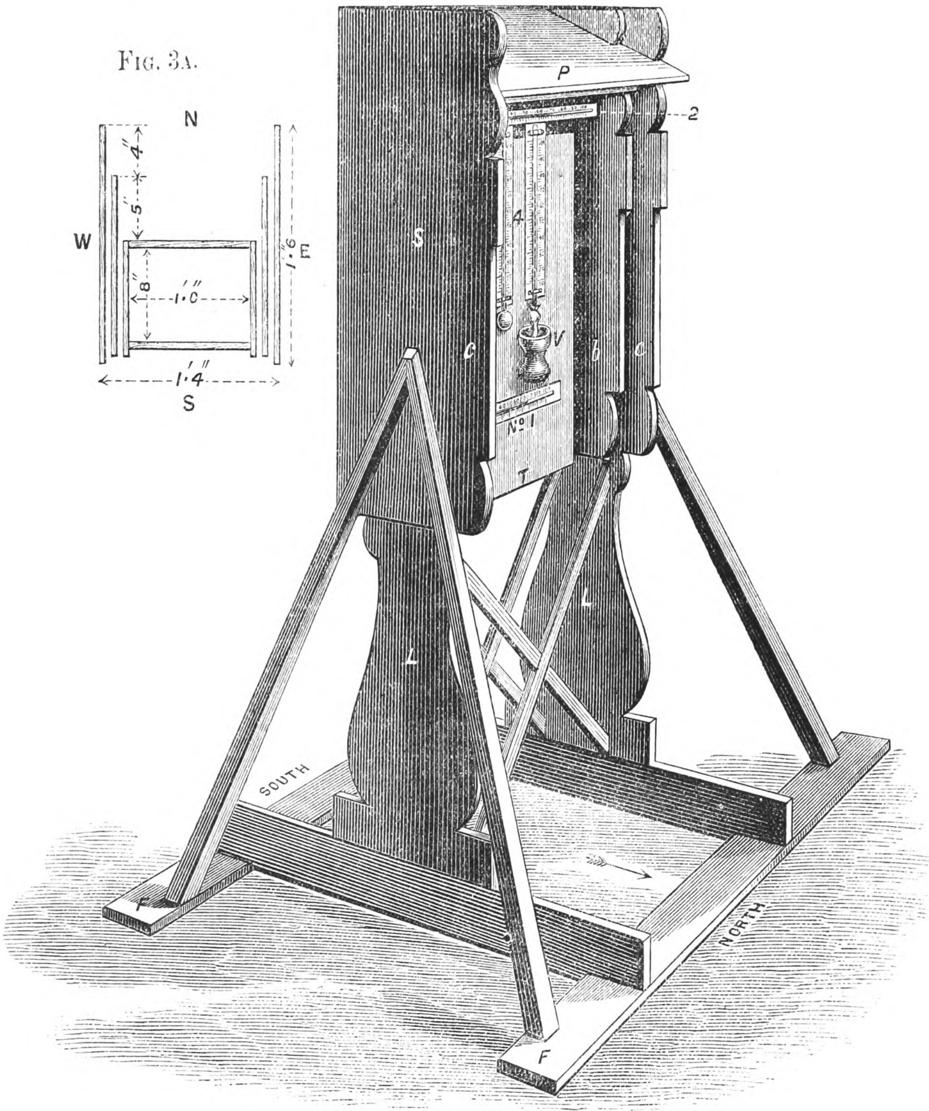


FIG. 3.

The stand as designed by Mr. Lawson about 1840 is accurately represented in the accompanying engraving and plan (Figs. 3 and 3*a*). The whole of the woodwork was to be ½ inch deal, painted white, the extreme height 6 feet 3 inches, the space between the double sides ¾ of an inch, the other dimensions can be taken from the drawings. The flat boards F F may be weighted or pegged to secure firmness, the legs L L are merely prolongations of the sides S C and C, the duplicate sides are kept apart by small blocks of wood, through which the screws pass. P is a sloping double roof to throw off the rain, No. 1 is the maximum thermometer, No. 2 the minimum, Nos. 3 and 4 the dry and wet bulb.

III. *Stow's Stand.*—This stand was designed by the Rev. F. W. Stow, F.M.S., of Aysgarth, Yorkshire, and was intended at first merely for his own private use. He, however, submitted it for comparison with the others, and in consequence of the experience thus gained, subsequently made considerable alterations in its general form and arrangement. The stand as tested is shown in the diagram (Fig. 4).

A is a stout post firmly fixed in the ground, and steadied by lateral supports. It is narrowed to a circular rod of 2½ inches diameter from the point where it passes through the horizontal board (B), and at its upper end, on which the weight of the stand principally rests, is inserted in a block of wood placed in the angle of the boards (CC). The whole frame turns upon the post A, but though this is a convenient arrangement, it is not absolutely necessary that it should turn at all. (B) is a board of full ½-inch deal, 4 feet long and 1 foot 10 inches or 2 feet wide, through the centre of which the post (A) passes. It is 4 feet 3 inches above the grass. Upon (B) are fastened the boards (C C), of ordinary ½-inch deal, and of the same width as B, at an angle of 30°, so as to meet at a point 1 foot above B. At the back, which is the sunny side, wide laths are placed across from one of the boards (C) to the other, sloped at an angle just sufficient to throw the rain outwards, and to prevent the sun's rays from falling on the board (B), while the breeze is allowed to pass freely through. At the front similar venetians are placed, but space is left open in the centre to allow the scales of the dry and wet bulb thermometers (D) to be seen. These instruments are either screwed at the top to the block in the angle of the boards (C C), or fastened on a frame which is suspended from the block. Their scales are above the horizontal board, but the lower parts of their stems pass through it, and the bulbs are 3 inches or nearly so, below it. They are arranged on each side of the post (A), and at least 2 inches in front of it. (E) is a piece of wood screwed to the bottom of the board (B), and carrying the maximum thermometer, (F) is a similar piece of wood carrying the minimum thermometer. These thermometers are hung on brass screws, and their bulbs project, as will be seen, considerably beyond the pieces of wood, (E) and (F), which are placed not at the front of the stand, but at half of the width of the board (B) from it. Thus the maximum and the minimum thermometers have their bulbs as nearly as may be under the centre of the board (B), and 3 inches below it. It is not necessary, as in the Glaisher stand, that one of them should be made with the bulb at the reverse end. In the engraving the minimum thermometer is represented as placed on the other side of (F), and is read with facility from the back of the stand.

STOW'S STAND.

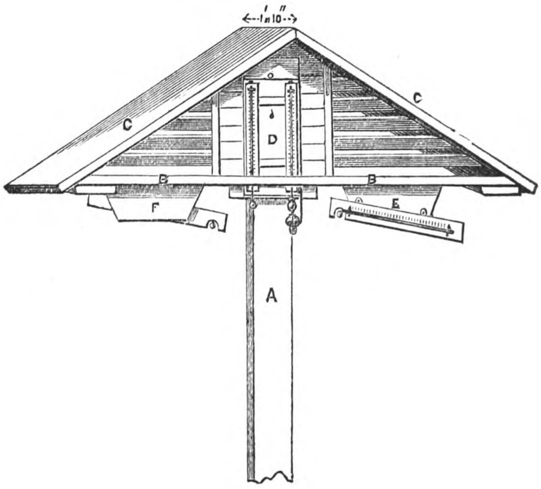


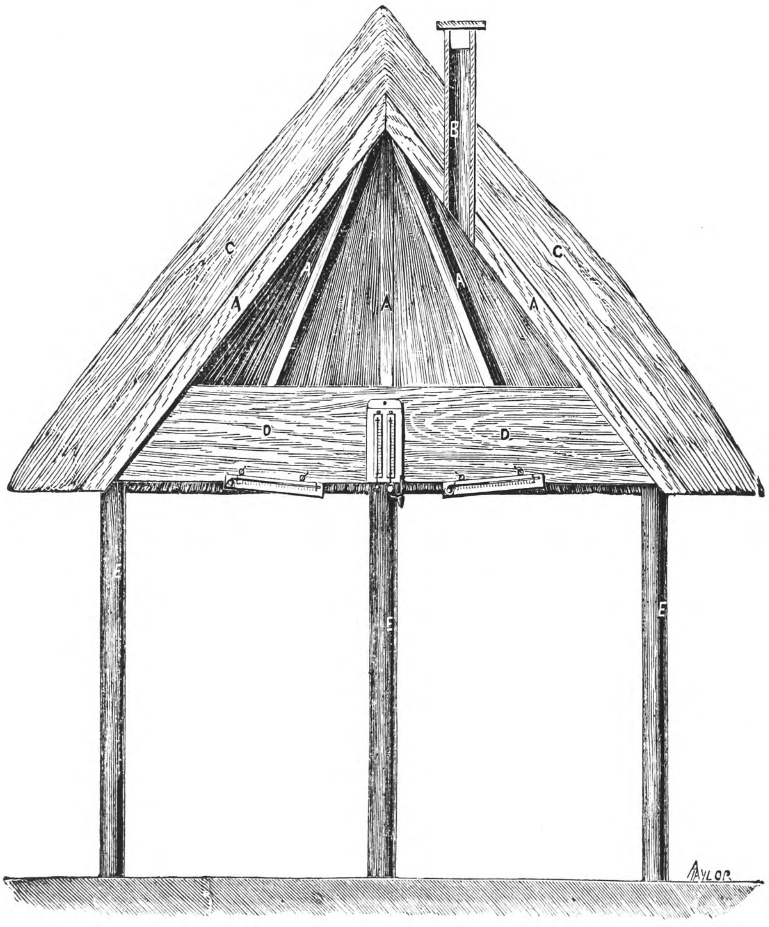
FIG. 4.

IV. *Martin's.*—The late Dr. Martin designed this stand (Fig. 5, p. [18]), for use at Ventnor in 1783, it is therefore one of the oldest patterns extant. It is not pretended that Dr. Martin was the first to adopt the following form of stand, but we know of no description prior to that which he gave in "The Undercliff," published in 1849, in the preface to which he describes with detail the quality and position of all his instruments. He writes :—

"The thermometers have been placed in a little observatory built expressly in a most exposed, and, for such a purpose, unobjectionable situation. It consists of a thatched roof, supported on wooden uprights, partly resting against a wall, the whole being between 8 and 9 feet in height.

"At a distance of about 6 feet from the ground small deal boards are fixed transversely, so as to give each pair of thermometers its proper aspect; and the roof is ventilated by a zinc chimney for the purpose of preventing any accumulation of heated air from affecting the instruments, which are hung upon the deal boards just mentioned, each pair being placed opposite a cardinal point of the compass. There is no building or high ground within a considerable distance, and the whole has been so contrived that the northern pair of thermometers, from which the results have been derived, can by no accident be affected by radiation or reflection."

MARTIN'S STAND.



A A A. Rafters. B. Chimney. C C. Thatch. D D. Thermometer Board. E E E. Posts.

FIG. 5.

Thus Dr. Martin's plan was to arrange the height of the stand so that the thermometer bulbs should be 6 feet from the ground, but as 4 feet has since been so universally adopted, the specimen tested was altered so as to bring this stand (so far as height is concerned) into uniformity with the others.

The section of the stand (Fig. 5) has been prepared so as to show its general structure and the positions of the thermometers on it.

V. *Stevenson's.*—This stand was first figured and described in the "Journal of the Scottish Meteorological Society, 1866," New Series, Vol. 1, p. 122.

STEVENSON'S STAND.

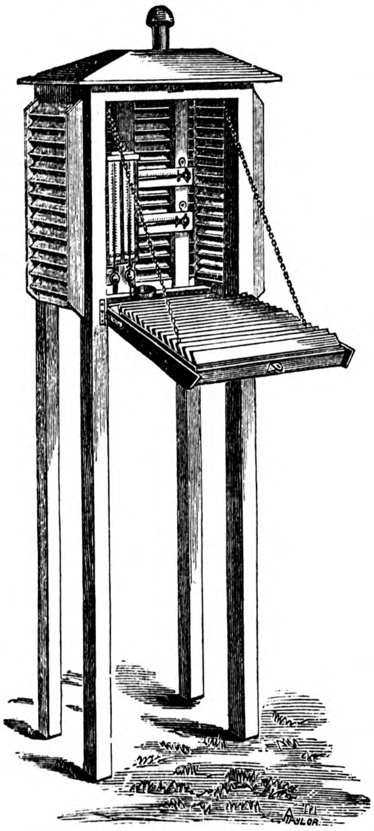


Fig. 6.

The screen is represented in the margin, the northern side being shown let down, as when observations have to be taken; ordinarily the north side is up like the other three, and the thermometers are thus protected from direct solar rays; the top of the box is solid, to keep out the rain, but is *not double;* the small capped chimney is intended to prevent the accumulation of heated air, and the bottom is perfectly open, the louvres are fitted on the ingenious plan shown in the annexed figure (Fig. 6*a*.), and the thermometers hung as shown in Fig. 6.

"The skeleton framework consists of pieces 1 inch square, the louvres are 1¼ inches by 1 inch and the herring-bone standards to which they are attached are ½ inch by 1½ inches. The internal dimensions of the box are 15 inches high by 14½ inches long, by 7½ inches wide; the roof, which is solid, rising above to the height of 4 inches. One of the louvre frames, forming one side, is on hinges and opens downwards, while it is prevented from falling so low as to injure the hinges, by light chains, connecting the door with the framework. The screen was supported on four stout posts (4 inches square), arranged so that the dry and wet thermometer bulbs were 4 feet above the grass."

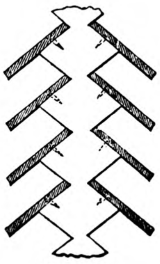


Fig. 6*a*.

VI. *Glaisher's* (sometimes called "The Greenwich") stand (Fig. 7, p. [20]) was first employed at the Royal Observatory, Greenwich, where it was erected in 1841. The thermometers are so attached to the front face of a vertical board, that their bulbs are 3 or 4 inches below the horizontal one, and thus freely exposed to the air on all sides. Many copies of this stand are in use in England, but several of them are very faulty reproductions. Mr. Jas. Glaisher, F.R.S., himself supplied the drawings and dimensions from which the Strathfield Turgiss copy was constructed. A full description of the stand is given in the Meteorological Magazine, Vol. III., p. 155.

It is to be remarked that Glaisher's stand is arranged so as to allow the back, or inclined part, to be turned to the sun, and the air passes freely through the frame, so that the heat which is conducted through the outer inclined board meets with a current of air passing between it and the second inclined board; and the heat which may pass through the second inclined board meets with a much larger current of air passing between it and the horizontal and vertical boards.

GLAISHER'S STAND.—SIDE VIEW.

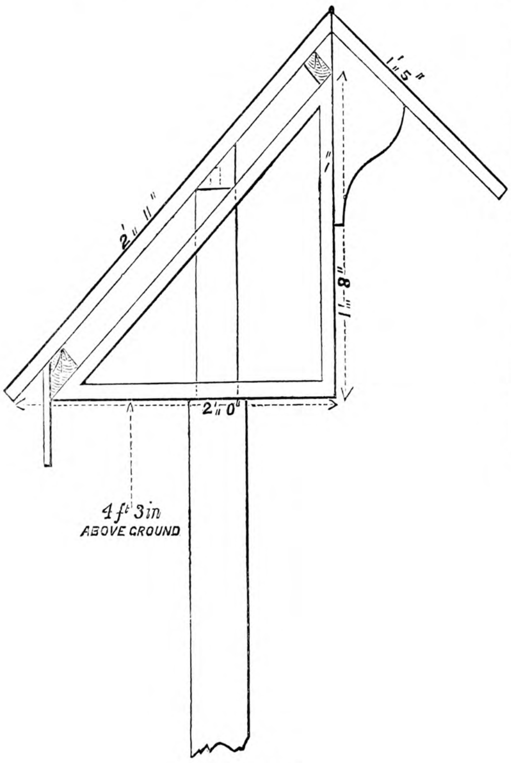


FIG. 7.

GLAISHER'S STAND.—FRONT VIEW.

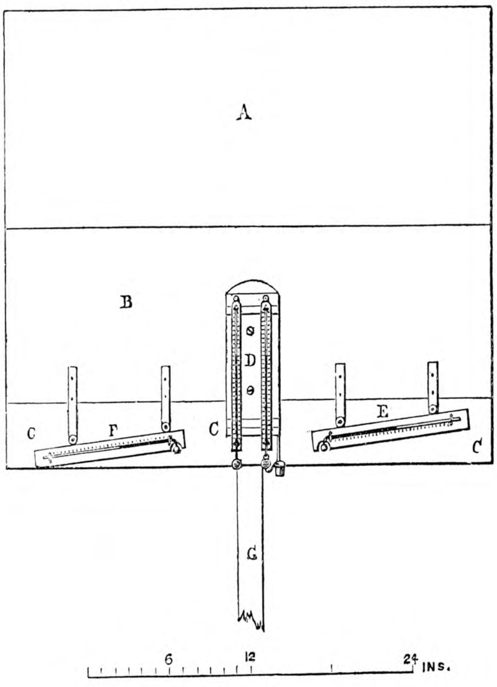


FIG. 7a.

PASTORELLI'S STAND.

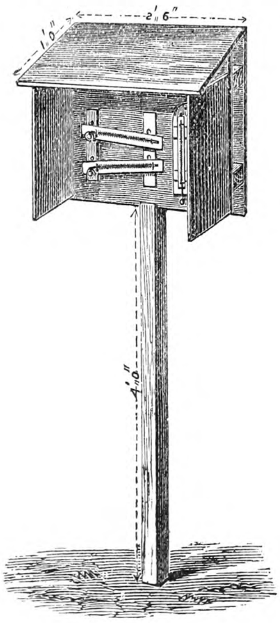


FIG. 8.

VII. *Pastorelli's Stand.*—This stand (Fig. 8) was tried at the request of Mr. Pastorelli, who supplied a specimen; it is one of the cheapest forms of stand, and one which can be reproduced by any person who can handle a saw. In construction it consists of a back formed by two vertical boards, having an interval of 2 inches between them. These are mounted on a post furnished with two "wings," which project 6 inches in front. The stand as constructed faced true N., and the instruments were hung on small battens fastened to the inner side of the back, so as to keep the bulbs of the thermometers away from the back, and to allow the air to circulate freely round them.

VIII. *Morris's.*—It is necessary to have some name for each pattern of screen, and that of the Rev. A. J. T. Morris is attached to this because it is an exact reproduction of the stand described in his "Treatise on Meteorology." At the same time it not inadequately represents the old form of exposure, namely, that of thermometers on a board fastened outside a north window, in which way those were exposed of which records were published by the Royal Society in the "Philosophical Transactions" from 1774 to 1843. The Morris's stand at Strathfield Turgiss was attached to the wall of the Rectory facing N. 20° E.

The stand is similar to Pastorelli's (No. VII.), but (as it is fastened to a wall) it has only a single board for the back. In size it is just large enough to carry the dry, wet, maximum, and minimum thermometers when mounted, like those on Pastorelli's stand.

It was constructed of 1¼-inch board, and a space was left between the top and the wings to enable the air to circulate freely.

It is the only form of wall screen which was tested.

IX. *Griffith's.*—This stand (Fig. 9), like Pastorelli's, may be regarded as having being accidentally included. Mr. Griffith desires to have it explained that his stand was not intended for competition; it was, like scores of others, an original design, because at the time of its erection no other pattern was known to him. It is brought into competition, however, by the fact of the other stands being all congregated in the rectory grounds, and because the extreme simplicity of its shape renders it one of the cheapest forms, and one which any village carpenter could readily construct. It consists, as will be seen, of double boards at the sides, with intervening spaces, and of triple boards at the back, all separated by air spaces; the sides are brought so far forward as to prevent either morning or evening sun from reaching the thermometers.

The stand has also a flat board, 1 inch thick, painted white on its lower side, fixed a few inches below the bulbs of the thermometers, to prevent heat being radiated or reflected from the ground to the bulbs of the instruments; this board covers the whole space enclosed by the four outer posts, and is indicated in the sketch by a double line drawn across from the one outer post to the other. The two thermometers on the right of the stand are not in immediate contact with the wood, large holes being bored in their rear to admit freely the air after it has passed the two outer sheltering screens. The board to which the thermometers are affixed is set back about two feet from the outer front and wings.

GRIFFITH'S STAND.

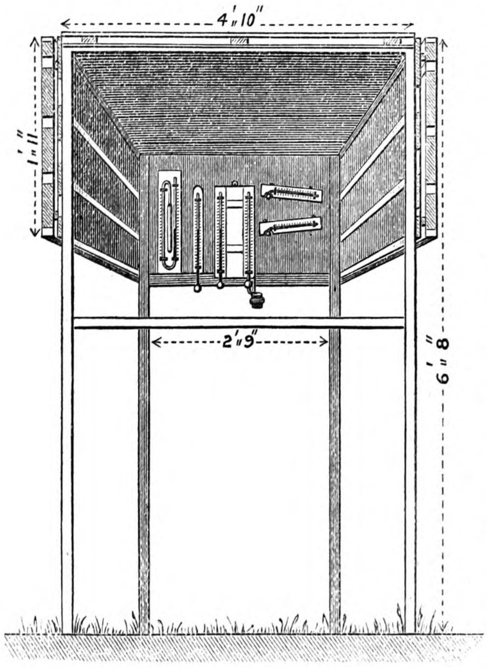


FIG. 9.

X. *Kew Stand.*—It has been thought desirable from the first that a stand from the well-known Kew pattern of stand should be tried, but its trial was postponed because the funds available were insufficient to purchase one. After the experiments had been organised it became evident that one was absolutely necessary, and eventually the difficulty was met by the Kew Committee kindly lending their old stand. Owing to its bulk (nearly 200 cubic feet), weight and age, its removal was somewhat difficult, but thanks to the supervision of Dr. Balfour Stewart, F.R.S., it reached Strathfield Turgiss in safety, and after very trifling repairs, was erected in the experimental grounds. This stand is mentioned last only because it was the last erected at Stratfield Turgiss.

As will be seen from the engraving (Fig 10), it is a very large (6 feet × 6 feet × 5 feet), nearly cubical, louvre-boarded, double box, with louvre-boarded folding doors to each box; the bottom, with the exception of the beams necessary to support the inner box, is quite open.

In order to maintain perfect uniformity among all the stands, the Kew stand was not erected at the same height above the ground that it was at Kew, but, as represented in the engraving, so much of the posts were cut off as to bring the thermometers to the uniform height of four feet above the turf.

THE KEW STAND.

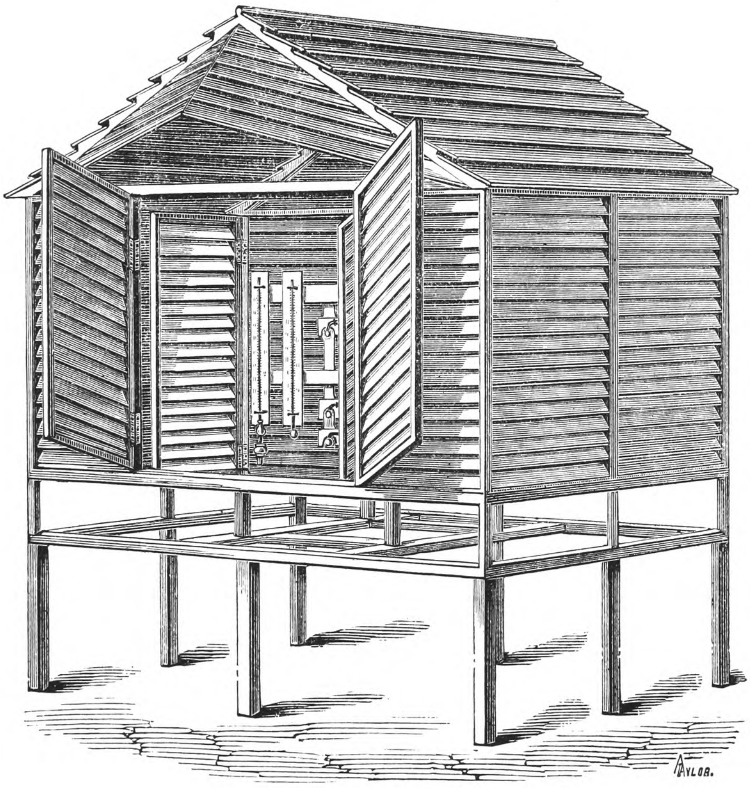


Fig. 10.

XI. *Suspended Thermometer.*—The following paragraph occurs in a paper by Mr. Glaisher, F.R.S., in the "Phil. Trans.," 1847, p. 142:—

"Hence there is no doubt that if a thermometer be freely suspended in the air, with its bulb at the height of 13 feet above the soil and far from any object to reflect heat to it, its readings will represent the true temperature of the air at the time, and much more truly than those placed near the ground, or within a few feet of walls and buildings."

Arrangements were therefore made for suspending a delicate mercurial thermometer at the above-mentioned height, so that it should be impossible for it to receive any sensible amount of heat either by reflection or radiation. At a later stage of the experiments fresh poles were erected, and the thermometer was raised to 24 feet above the ground. To remove the only possible basis of objection to the accuracy of the results (viz., the influence of the stem of the thermometer on the temperature of the bulb), one was specially constructed with the upper part enamelled to facilitate reading, while the lower part and the bulb were made of very clear glass, and filled with uncoloured alcohol, so as to be perfectly transparent; indeed on many occasions the bulb was invisible from the ground.

XII. *Aspirated Thermometer.*—At the suggestion of Dr. E. J. Mills, F.R.S., a thermometer was placed on Lawson's stand in the shade, with its bulb in the middle of a small platinum cylinder, of which the lower end was open, and the upper end connected with an aspirator which, for three minutes previous to the reading being taken, caused a current of air, at the rate of about one-third of a mile per hour, to pass over the bulb (Fig. 11). On the opposite side of the stand was placed a precisely similar thermometer, whose bulb was surrounded by a similar metal cylinder, but which was not aspirated. To this the term "non-aspirated" has been given, and it was intended to show what amount of disturbance would occur in the registration of temperature by the aspirated thermometer owing to the fact of its bulb being surrounded by a metal cylinder as described.

ASPIRATED THERMOMETER.

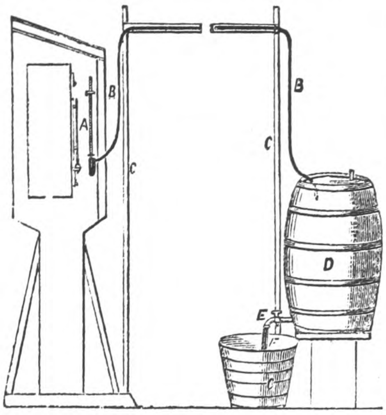


FIG. 11.

XIII. *Shrubbery.*—In order to test the effect produced by the shelter of trees and shrubs, which some observers hold to produce true "shade," a set of thermometers were placed for a time upon a Pastorelli (No. VII.) stand, which was completely buried in a shrubbery.

The instruments used on each stand were:—

1 Dry-bulb thermometer.
1 Wet-bulb „
1 Phillip's maximum.
1 Rutherford's maximum.

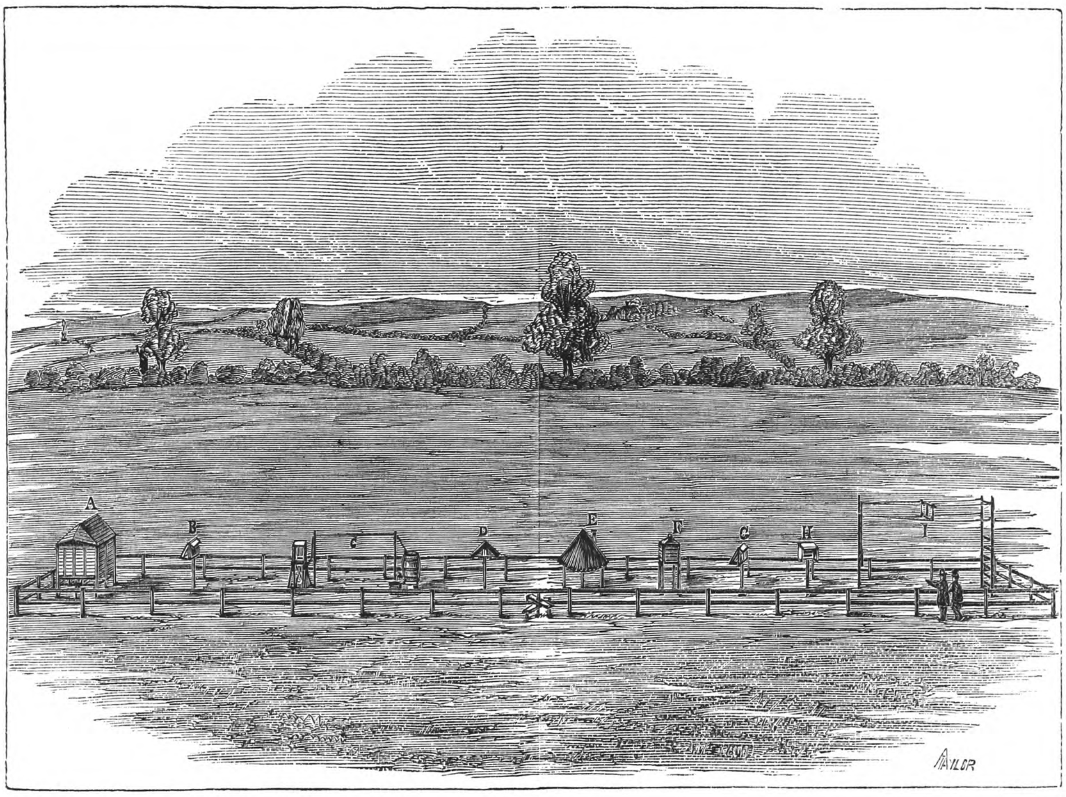
The accompanying sketch (Fig. 12, see p. [24]) shows the relative positions of the various screens.

Morris's stand was, as before stated, on the wall of the house. *Griffith's* stand was in a different place, a few yards off, but equally well exposed. See G. in plan on page [14].

Shrubbery, see S. in plan on page [14].

THERMOMETRICAL ENCLOSURE, STRATHFIELD TURGISS.

[LOOKING SOUTH.]



A = The Kew Stand.
B = James's „
C = Lawson's Stand, with the Aspirated Thermometer attached.
D = Stowe's Stand.

E = Martin's Stand.
F = Stevenson's Stand.
G = Glaisher's „
H = Pastorelli's „
I = The suspended Thermometer.

FIG. 12.

PART II.—DISCUSSION OF THE OBSERVATIONS.

The observations consisted of the uncorrected readings of dry and wet bulb thermometers taken three times daily (9 a.m., 3 p.m., and 9 p.m.), and of the maximum and minimum thermometers read once daily (9 a.m.). These records extend from November 1868 to April 1870 (excepting January 1870). There were ten distinct forms of thermometer screen in use.

Before proceeding with the work, however, the following questions presented themselves, viz., " What is the object of a thermometer screen ? " and " What conditions must a stand or screen fulfil " before it can be considered worth using at all ? " The settlement of these points was materially simplified by the action of Mr. Symons, who issued a series of questions to those gentlemen who had paid the most attention to the subject, and on receiving their answers submitted a digest of them to discussion by the Fellows of the Meteorological Society at their meeting on November 19th, 1873. The discussion excited great interest, and the following resolutions were agreed to :—

Conditions to be fulfilled.

I. In taking the temperature of the air, it is necessary that the readings of the thermometers be not affected by anything else.

II. There must be free access of air round the thermometer.

III. The thermometer must be shielded at all times from the direct rays of the sun.

IV. The stand must be so arranged that even when its own external temperature is altered, the thermometers suspended on (or in) it shall not be thereby affected.

V. As reflected heat must diminish the accuracy with which thermometers indicate air or shade temperature, this disturbing cause should be excluded.

VI. No rain should ever reach the thermometers, for if it does, it improperly affects their temperature, occasionally making the dry bulb read even lower than the wet bulb.

VII. The action of the stand must be unaffected by snow, either by the temperature of the snow itself, or by its obstructing the circulation of air.

VIII. It is advisable that one pattern of stand be used in all localities. The stand should therefore be absolutely independent of all surrounding objects.

IX. It is very desirable that the stand require no attention between the hours of observation.

X. It is also desirable, but not absolutely necessary :

(1.) That space in the screen be provided for a duplicate set of instruments.
(2.) That the stand should not be more costly than is necessary to secure efficiency.
(3.) That it should be as portable as possible.

In endeavouring to discuss the observations, these conditions have been constantly borne in mind, but it is obvious that some of them are of less importance than others. Thus the questions of capacity for duplicate instruments, of cost and portability, are obviously of secondary importance, and even the necessity of using one form of screen in all localities is no longer imperative, if it can be proved that two or more forms will give identical indications, while in some localities one, in some another, may possess peculiar advantages. When, however, we come to conditions which affect the indications of the instruments, we approach the more important part of the subject, and and it is to these that I now more particularly draw attention.

It will be readily seen on examining the resolutions quoted, that two of them, Nos. VI. and VII., have no reference to the instrumental readings. It is easy to ascertain the liability of the screen to admit rain and other moisture to the bulbs. On examining the sheets, it appears that for the first three months the due registration of this feature had not received attention, but during the remainder of the year a mark (red line or asterisk) was drawn against the readings of the instruments whenever the bulbs were found wetted by rain, fog, or dew. The numbers of occasions when this was found to be the case with each screen are as follows:

Open screens:	
Pastorelli	32
Lawson	25
James	34
Glaisher	62
Stow	36
Intermediate screens:	
Martin	1
Griffith	0
Closed screens:	
Stevenson	5
Kew	1
Wall screen:	
Morris	1

If the principle be adhered to, that a good screen should thoroughly protect the thermometers from rain, the whole of the open screens must be declared failures. Of the remainder, the only one which *never* failed was that of Mr. Griffith, but the Kew, Martin's, and Morris's each failed only once, and Stevenson's very rarely. In fact an examination of the observations shows that the occurrences in Stevenson's were owing more to some defect, which had appeared in the screen during its use, than to any inherent defect in the principle on which it is constructed,* for it is unreasonable to suppose that there were no heavy driving rains during the first eleven months of 1869. An occurrence of this kind was noticed with the writer's own Stevenson's screen; the roof having cracked admitted the water pretty freely. During very heavy rain it is found that the rain falling on the roof of such a screen splashes over the upper edge of the chimney and thus gets into the screen. This, however, does not reach the thermometers, but falls to the ground underneath.

It has been argued by the advocates of open screens that in practice the thermometers are not found to be wetted by rain, &c. When, however, we consider the construction of the screens, and the manner in which the instruments are exposed, it would appear that the results shown above are not only what we might naturally look for, but what must occur whenever rain falls, accompanied by a strong wind from the point towards which the screen is open.

The conclusion is therefore obvious, that open screens of the types examined are, in this respect, inferior to the closed screens.

We now come to that part of the work which depends on the readings of the various instruments. This is one of considerable difficulty, and needs some little explanation as to the lines which have been followed in carrying out the inquiry.

1. As to the readings themselves. With the exception of the dry and wet bulb thermometers in use on the Griffith's stands, and of the maximum and minimum thermometers on the Pastorelli

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* On one other occasion, however, (November 22, 1868,) during a heavy south-westerly gale and rain, the rain was "driven" into Stevenson's screen, and wetted all the thermometers.

stand, the corrections for index error are very trifling, and are, moreover, nearly all positive quantities. In the preparation of the tables referred to in this Report* they have been therefore neglected, except in the cases of the four instruments named, where the corrections were not only rather large, but for three out of the four thermometers they had to be applied subtractively. For the Pastorelli's stand, therefore, the values in the tables have been corrected as follows:—

To the maximum thermometer a correction of −0°·5 has been applied for all readings above 50°.

To the minimum thermometer a correction of +0°·5 has been applied for all readings above 50°.

In Griffith's stand a correction of −0°·5 has been applied to all the dry and wet bulb values.

The other smaller corrections have been neglected, as being too small and too much alike to have any practical effect on the results. In the final tables (Nos. VI. and VII.) the whole of the values for all thermometers have been carefully corrected.

For the more convenient comparison of the stands the following classification was adopted:—

A. *Open Screens*,—in which, with the exception of slight roof shelter, the thermometers are fully, or nearly fully, exposed to the air. In this class are included Pastorelli's, Lawson's, James', Glaisher's, and Stow's.

B. *Intermediate Screens*,—in which, in addition to the above protection, the thermometers are partially protected laterally from the rain. In this class I have included Martin's and Griffith's, but it is doubtful whether the former might not have been placed in the next class, as the bulbs do not extend below the eaves of the stand.

C. *Closed Screens*,—in which the thermometers are protected on all sides as well as above. In this class are included Stevenson's and the Kew stands.

D. *Wall Screens*.—Morris's only.

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* These tables are preserved for reference in the Meteorological Office; it has not been thought necessary to print them *in extenso*, but an abstract of their principal results will be found in a separate note. The tables are as follows:

I. Corrections to be applied to the thermometers used.
II. List of the number of times in which the dry bulb thermometer was found wet from rain, &c., in each screen during the year 1869.
III. Monthly means of dry and wet bulb and of maximum and minimum thermometers in all weathers.
IV. Monthly means of dry and wet bulb thermometers with "clear sky."
IV*a*. " " " " "detached clouds."
IV*b*. " " " " "overcast sky."
IV*c*. " " " " "rain."
V. Monthly means of maximum and minimum thermometers with "clear sky."
V*a*. " " " " "detached clouds."
V*b*. " " " " "overcast sky."
V*c*. " " " " "rain."

Tables III. to V*c*., inclusive, refer to the eight months January, February, April, May, July, August, October, November.

VI. Corrected means of daily maximum and minimum temperatures, and of daily range in all the months.
VI*a*. Differences between the daily maximum and minimum temperatures, and the daily range in Stevenson's and in the other screens.
VII. Differences between the maximum and minimum readings in the other forms of screen, and in Stevenson's with "clear sky."
VII*a*. " " " " " "detached clouds."
VII*b*. " " " " " "overcast sky."
VII*c*. " " " " " "rain."

Tables VII., VII*c*., are for the eight months as before.

E. *The Shrubbery.*—This was a Pastorelli's stand completely hidden in a large bed of shrubs, which surrounded it closely on all sides. Its indications have not been discussed, as they were evidently of no value whatever for the present purpose.

F. The suspended thermometer, and the aspirated and non-aspirated thermometers, which will be referred to towards the close of this Report.

2. As to the information used. The course pursued was to take two months in each quarter and examine carefully the indications for those periods; then, should there be any irregularity which needed further investigation, to use the third month's indications, in order to clear up the difficulty. The observations which have been worked out in detail are those for January and February, for Winter; April and May, for Spring; July and August, for Summer; October and November, for Autumn.

A preliminary examination of these monthly and two-monthly means of temperature suggested that the qualities of the stands would be best compared, if the observations were grouped according to the state of the weather. The conditions under which I decided to group the readings were four; namely,

1. Clear blue sky. 2. Partially cloudy. 3. Overcast, but not raining. 4. Raining.

The available data consist of the temperatures at 9 a.m., 3 and 9 p.m. in those cases wherein the state of the weather was recorded, which unfortunately were comparatively few. The values of the mean temperatures at the times when the sky is marked "overcast" will first be examined.

In *January and February* at 9 a.m. when the sun's power is low and temperature has only just begun to rise from the night's cold, we find that, except for Pastorelli's stand and the suspended and aspirated thermometer, there is hardly any difference at all between the values for the different stands. In a diagram of the results the line joining the different points is almost straight, showing that on all stands the readings agree very closely. At 3 p.m. the curve is still more level; all the stands agree; and at 9 p.m. the only variations worth noting are that the Lawson's values are rather lower and the suspended thermometer rather higher than the others.

In *April and May* (where the sun's power is increasing), larger differences begin to appear. At 9 a.m. the open and intermediate screens all show readings rather in excess of the closed. Pastorelli's, Lawson's, and Griffith's leading, with mean differences of a degree to a degree and a half. Morris's screen also gives a high value, but this points to the fact that the solar effect has not been eliminated by the clouds, the screen (as before stated) being on a wall exposed to the sun at 9 a.m. in the spring and summer months. The suspended thermometer also reads rather high, and the aspirated and non-aspirated thermometers read highest of all! At 3 p.m. the Glaisher's, James's, and Stow's stand (among the open stands), Martin's (among the intermediate), and the suspended thermometer agree closely with the Stevenson's and Kew screens. The very sensitive Pastorelli's and Lawson's stands, however, with Griffith's and Morris's* are all relatively rather (about 1°) high. The aspirated and non-aspirated are again highest.

At 9 p.m. (when temperature is falling, but terrestrial radiation is a good deal checked by cloud), it is found that the open screens, though giving readings rather lower than the closed, yet differ from them very slightly indeed. The Morris pattern is still a little higher than the closed, but the suspended thermometer agrees fairly well, while the aspirated and non-aspirated are a little low, like the other thermometers on Lawson's stand.

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* The relatively high 3 p.m. readings shown by Morris's stand during overcast weather are very peculiar. The only explanation I can offer of them is that (if true) they may be caused by the wall (which faces 20° E.) having been heated by the sun earlier in the day.

July and August.—The curves are very similar to those for April and May, only the variations shown are of greater amplitude. While temperature is rising (*i.e.* during the morning and early afternoon) the open screens and Griffith's always read higher than the closed, and Martin's gives values intermediate between the two; the suspended thermometer also reads high, and the aspirated and non-aspirated very high, when compared with the thermometers in the closed screens. At night, however, the contrary is the case, but the differences are slight, the open screens read lower than the closed, the wall screen (Morris's) rather higher. The suspended agrees remarkably well with the closed, while the aspirated and non-aspirated (like the others on the Lawson's stand) are low.

October and November.—The sun is now again acting with little power, and the clouds are denser than in summer. We therefore find the relative indication in the different screens agreeing remarkably with those for the winter months, and especially those obtained from the observations made at 9 a.m. and 3 p.m. The 9 p.m. readings, however, show rather less regularity than those for the winter months, Lawson's, Griffith's, and Morris's screens giving relatively lower values than in January and February.

On examining the corresponding values for readings taken during the prevalence of "blue sky," we still find a considerable approximation to uniformity in the temperatures recorded by all the stands during the winter and late autumn months, especially in those registered at 3 p.m., but the curves are not so even as they were during the prevalence of overcast weather. In the spring and summer months, however, we again find the open screens giving higher values at 9 a.m. and 3 p.m., and lower readings at 9 a.m. than the closed screens. Among the open stands, Pastorelli's and Lawson's stands show a much greater range than James's, Glaisher's, and Stowe's; but all show a much greater range than the closed stands. The behaviour of the intermediate stands is peculiar At 9 a.m. (with rising temperature), Griffith's agrees with the closed stands, and Martin's gives indications too high, while at 3 p.m. (in spring and autumn), Martin's and Griffith's are both higher than the closed. The peculiar irregularity which appeared in the observations on Morris's stand during dull weather is, however, not traceable in those made during clear weather, the 3 p.m. readings being always lower and the 9 p.m. higher than those on the stands which are placed out in the open.

The observations made during the prevalence of "detached cloud," show variations intermediate between those made during clear blue, and those with overcast, skies, while the observations made during the prevalence of rain, give values very similar to those made with an overcast sky, only that in the winter months, when the solar rays are weakest, the readings at all hours are on the whole slightly lower in the open than in the closed screens. This is probably owing to the wetting of the bulbs of the thermometers in the former.

Putting on one side for the moment the occasional irregularities noted with regard to some of the stands, the broad features which come out clearly are these:—

(1.) That in winter time, and especially in very cloudy (overcast) weather, when the sun's power is slight, and when terrestrial radiation is greatly checked, the indications of the stands agree very closely indeed.

(2.) That as the sun's power increases, and during clear bright weather at nights, considerable differences manifest themselves, the open screens (and especially Pastorelli's and Lawson's), giving indications considerably in excess of the closed screens during the day, and in defect during the night.

(3.) That there are also some irregularities noticed from time to time, some of which are probably dependent on rapid changes which often take place in the temperature during clear weather (instances of which may be seen in the thermograph curves published in the Quarterly Weather Reports), and which occur during the time necessarily occupied in reading so many sets of instruments; and others on which the present series of experiments throw no light at all.

(4.) That the suspended thermometer gives readings in excess of the closed (and often of all) screens during the day time, but agreeing very well with the closed screen at 9 p.m.

(5.) That the aspirated and non-aspirated thermometers read considerably higher than those on the closed screen (often higher than those on any screen) during the day time, and lower at the night observations.

The means of daily maximum and minimum temperatures registered on each stand have been grouped in a manner similar to the 9 a.m., 3 p.m., and 9 p.m. readings. It was very difficult to do this, as the exact state of the weather at the time of the maximum and minimum readings was unknown. The plan adopted, therefore, was to assume that the weather at 3 p.m. was the weather prevalent at the time of the maximum, and the weather at 9 a.m. that at the time of minimum. The results, notwithstanding the doubt as to the weather at the time of registration, bear out very well the main features shown by the 9 a.m., 3 p.m., and 9 p.m. readings, and even render them more clear. The afternoon peculiarity shown in Morris's stand and the irregularities referred to on p. [29] with regard to Glaisher's stand disappear entirely. The conclusions drawn from the indications are these:—

1. Even in most of the winter months the open and Griffith's stands show slightly higher maxima and lower minima than the closed.
2 This difference increases as the sun's power increases, so that while in the winter months* the values for maximum temperatures, in the more generally used of the open stands (*i.e.* Glaisher's and James's), differ only a few tenths of a degree from those given by the closed stands, yet in the summer months the mean difference exceeds a degree and a half, and on individual occasions is still greater.
3. That the difference between the minima in winter time and those in summer have not so large a range as those for the maxima.
4. That the mean ranges for Pastorelli's, Lawson's, and Griffith's stands are not only far greater than those for the closed stands, but also than those for the other open stands.
5. That the Kew and Stevenson's stands (the only closed stands tried), agree very closely indeed in their indications, the range being only *slightly* less on the former than on the latter during the summer months.
6. That Martin's screen gives maximum readings very similar to the closed screen, except in quite the summer months, when it gives higher maximum readings than the closed. Its minima, however, are usually even higher than those of the closed screen.
7. That the wall screen (except when affected by the direct solar rays) is sluggish, giving maxima considerably below, and minima considerably above, those of the screens which stand out in the open.
8. The suspended thermometer gives indications in excess of those in the closed, and in most of the open screens as long as the sun is shining, but that at 9 p.m. its readings agree very closely with those in the closed screens.

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* It will be seen, on referring to the table given at the end of this paper, that January is quite exceptional to the other months, as in that month the maxima are even lower on the Glaisher's than on the Stevenson's stand.

It seemed likely, therefore, that these variations were not owing to a sluggishness on the part of the closed screens in registering *bonâ fide* changes which take place in the actual temperatures of the air, and for these reasons:—

1. When the sun's power is small (in winter and late autumn) the readings taken on the closed stands agree much better with those on the open stands than they do during the summer.
2. That during these dull winter days great and sudden changes (other than diurnal range) *do* take place in the air temperature, and these seem to be registered (so far as these observations show) quite as truly by the closed as by the open stands.
3. That in proportion as the diurnal effects of solar and terrestrial radiation increase the difference between the indications of the various stands increases.

Therefore, as it is the instruments on the open stands which are exposed most to radiation and the reflection of heat, I came to the conclusion that it is the former which are faulty in recording too large a range of temperature, and not the latter in recording too small a range.

I therefore chose the latter (the closed) as the standards, with which finally to compare the readings on the other stands; and, looking at the close agreement of the two specimens tested, and their comparative bulk and expense, have concluded that Stevenson's screen is better adapted than any of the other of the stands tested to register the temperature of the air.

It is not pretended for one moment that even this screen is all that can be desired. On the contrary, there are two facts which throw considerable doubt on its accuracy. (1.) On referring to Tables A. to C. (pp. [33] to [35]) it will be seen that the means of the maxima recorded on the Glaisher's stand exceed those recorded in the Stevenson's screen by a larger amount when the sky is overcast than they do when it is clear and bright; and this would tend to show that while from a want of circulation of the air the Stevenson's screens, in dull weather, fail to record the true maximum readings, the amount of deficit is masked in bright weather by a certain amount of "heating up" of the air in the last-named screen. (2.) It is also apparent from the same tables that the means of the minimum readings recorded on Glaisher's stand are in each description of weather and at all seasons lower than those registered in a Stevenson's screen. This can hardly be the result of excessive radiation, at all events when the sky is overcast; and one is therefore tempted to think it must be from want of efficient circulation of air through the Stevenson. It nevertheless seems that Stevenson's and the Kew stands appear to have fewer defects than the others, and the Stevenson (though small) is on the whole the most handy and generally available.

My belief is (from a few experiments made privately, and still being prosecuted,) that even Stevenson's screen gives maximum readings in bright warm summer weather probably in excess of the true maximum temperature of the air, but I am not disposed, at present, to say anything with regard to its minima. It seems also highly probable that a certain amount of heat is reflected from the ground in hot bright weather, and causes the thermometers, both on the Stevenson's and Kew stands, to read higher than they should. This matter was looked into somewhat carefully by the Rev. F. W. Stow (with his improved screen) some years since, and his conclusions seem to be that in summer time the thermometers in a screen to which heat was reflected only from the ground more immediately beneath it, indicate values as much as 1° in excess of the true amount, but the Strathfield Turgiss experiments give no means of verifying this statement.

Tables have been drawn out to show the mean and extreme difference recorded between the maximum and minimum readings in each kind of weather (*b*, *c*, *o*, and *r*), on all the stands when compared with those on Stevenson's, also the corrected means of the maximum and minimum for each month (during all weathers combined) for each screen, and the difference between these values for each and those for Stevenson's. These tables are designed for the conversion of readings taken on any of the forms of screen tested into equivalent values for Stevenson's stand.*

I am sensible that the present investigation does not leave the question in a satisfactory state. We do not know even now how far from *truth* the readings recorded are on any stand, but only how far they differ from a certain standard, and that standard is believed to be somewhat faulty. There is, however, one satisfactory result, and it is this—when the stands are similarly exposed there is hardly any difference at all between the mean daily temperature recorded on the open to those in the closed stands. (See Table G., p. [38.])

The still more important question of the positions in which the thermometer screens should be placed, and the amount of protection they need from the solar rays, &c., has not been touched, and the question of the suitability of the Stevenson's stand for hygrometrical observation is still open.

To complete the investigation it would be necessary to set at rest the following points:—

A. How much the readings of instruments in a Stevenson's screen differ from the true values for temperature of the air.

B. What is the difference between Glaisher's (as the typical open stand) and Stevenson's, for hygrometrical observations?

C. To settle on some form of stand for official use, or some alterations in those now used, which shall do away with the defects already observed.

D. There is then the larger question to settle, how far the placing of screens beneath the shadow of large solid buildings affects their indications: and (approximately) how far the readings taken in the small back gardens common in towns can be compared with those taken in large open spaces in the country.

12th May 1880. FREDC. GASTER.

ABSTRACT OF THE RESULTS OF THE OBSERVATIONS.

For purposes of comparison three typical forms of screens have been selected; of the open screens, that described as Glaisher's, of the intermediate, Martin's, and of the closed, Stevenson's. They will be indicated by the letters G M and S respectively.

The tables are as follows:—

A. The mean temperatures for the different screens and for the different seasons, at the three observing hours of 9 a.m., 3 p.m., and 9 p.m., with *a cloudless sky.*

B. The same, with *an overcast sky.*

C. The same, with *all aspects of the sky.*

D. Summary, showing differences of results in each case.

E. Mean temperatures on each typical screen.

F. Comparison of maxima and minima observed in each case.

G. Summary, showing the effect of the different screens on the mean temperatures for the whole year.

The results of Table D. are also shown graphically. Figs. 13 and 14, pp. [38], [39].

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* See note, p. [26].

TABLE A.

SHOWING for the SEVERAL SEASONS and for THREE TYPICAL SCREENS the MEAN TEMPERATURES at the hours of 9 a.m., 3 p.m., and 9 p.m. and the MEAN of the MAXIMA and MINIMA, with *Cloudless Sky.*

OBSERVATIONS.		WINTER.		SPRING.		SUMMER.		AUTUMN.	
		January.	February.	April.	May.	July.	August.	October.	November.
(*a*) 9 A.M.	G	35·6	37·8	53·5	56·6	71·8	64·2	44·7	36·7
	S	36·2	38·3	53·5	56·2	71·4	63·9	45·1	36·7
	M	36·1	38·3	54·1	57·0	72·1	64·4	45·5	36·9
	S—G	+0·6	+0·5	0·0	−0·4	−0·4	−0·3	+0·4	0·0
	S—M	+0·1	0·0	−0·6	−0·8	−0·7	−0·5	−0·4	−0·2
(*b*) 3 P.M.	G	41·3	46·8	66·1	59·2	75·7	73·1	53·3	43·5
	S	41·9	46·8	65·3	58·4	75·2	72·7	53·3	43·7
	M	41·6	46·7	65·9	59·3	76·2	73·3	53·6	43·7
	S—G	+0·6	0·0	−0·8	−0·8	−0·5	−0·4	0·0	+0·2
	S—M	+0·3	+0·1	−0·6	−0·9	−1·0	−0·6	−0·3	0·0
(*c*) 9 P.M.	G	37·5	41·0	47·6	45·5	59·5	56·8	43·5	36·6
	S	38·1	41·6	48·7	46·2	60·3	57·6	44·2	37·4
	M	38·0	41·6	48·8	46·5	60·7	57·8	44·2	37·4
	S—G	+0·6	+0·6	+1·1	+0·7	+0·8	+0·8	+0·7	+0·8
	S—M	+0·1	0·0	−0·1	−0·3	−0·4	−0·2	0·0	0·0
(*d*) MAX.	G	47·2	50·1	64·5	61·2	78·1	75·3	56·0	45·9
	S	47·6	49·7	64·4	60·6	77·0	74·6	56·0	45·9
	M	47·6	49·6	64·5	60·8	77·9	75·2	55·8	45·5
	S—G	+0·4	−0·4	−0·1	−0·6	−1·1	−0·7	0·0	0·0
	S—M	0·0	+0·1	−0·1	−0·2	−0·9	−0·6	+0·2	+0·4
(*e*) MIN.	G	32·6	36·2	39·2	41·3	49·2	46·2	37·7	31·1
	S	33·1	37·0	39·9	41·9	50·2	47·2	38·5	31·9
	M	33·4	37·2	40·4	42·6	51·1	48·0	38·9	32·4
	S—G	+0·5	+0·8	+0·7	+0·6	+1·0	+1·0	+0·8	+0·8
	S—M	−0·3	−0·2	−0·5	−0·7	−0·9	−0·8	−0·4	−0·5

TABLE B.

SHOWING for the SEVERAL SEASONS and for THREE TYPICAL SCREENS, the MEAN TEMPERATURE at the Hours of 9 a.m., 3 p.m., and 9 p.m., and the MEAN of the MAXIMA and MINIMA, with *Overcast Sky.*

OBSERVATIONS.		WINTER.		SPRING.		SUMMER.		AUTUMN.	
		January.	February.	April.	May.	July.	August.	October.	November.
9 A.M.	G	38·6	45·0	50·6	51·0	60·8	60·4	51·1	43·9
	S	38·6	45·0	50·3	50·9	60·4	60·1	50·9	43·9
	M	38·6	45·0	50·6	51·1	60·9	60·4	51·1	44·0
	S—G	0·0	0·0	−0·3	−0·1	−0·4	−0·3	−0·2	0·0
	S—M	0·0	0·0	−0·3	−0·2	−0·5	−0·3	−0·2	−0·1
3 P.M.	G	43·6	50·5	49·1	56·6	68·8	65·0	54·3	50·0
	S	43·8	50·5	48·8	55·9	68·0	64·4	53·7	50·2
	M	43·7	50·4	48·9	56·1	68·6	64·8	54·0	50·0
	S—G	+0·2	0·0	−0·3	−0·7	−0·8	−0·6	−0·6	+0·2
	S—M	+0·1	+0·1	−0·1	−0·2	−0·6	−0·4	−0·3	+0·2
9 P.M.	G	41·7	45·8	45·4	49·0	59·5	55·0	44·9	43·9
	S	41·8	45·7	45·6	49·2	60·0	55·9	45·2	44·1
	M	41·7	45·8	45·7	49·3	59·7	56·1	45·3	44·1
	S—G	+0·1	−0·1	+0·2	+0·2	+0·5	+0·9	+0·3	+0·2
	S—M	+0·1	−0·1	−0·1	−0·1	+0·3	−0·2	−0·1	0·0
MAX.	G	46·6	52·1	56·0	59·4	74·2	68·5	56·7	52·4
	S	46·6	52·1	55·0	57·7	72·8	67·0	56·6	51·8
	M	46·6	52·1	55·3	58·6	73·5	67·6	56·7	51·9
	S—G	0·0	0·0	−1·0	−1·7	−1·4	−1·5	−1·1	−0·6
	S—M	0·0	0·0	−0·3	−0·9	−0·7	−0·6	−0·1	−0·1
MIN.	G	38·3	42·8	41·2	43·2	53·3	49·3	40·9	39·2
	S	39·0	43·7	41·6	43·6	54·0	49·8	41·5	39·9
	M	39·4	43·8	41·9	43·9	54·5	50·6	41·9	40·2
	S—G	+0·7	+0·9	+0·4	+0·4	+0·7	+0·5	+0·6	+0·7
	S—M	−0·4	−0·1	−0·3	−0·3	−0·5	−0·8	−0·4	−0·3

TABLE C.

SHOWING for the SEVERAL SEASONS and for THREE TYPICAL SCREENS, the MEAN TEMPERATURES at the hours of 9 a.m., 3 p.m., and 9 p.m., and the MEANS of the MAXIMA and MINIMA with *all Aspects of the Sky.*

Observations.		Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
9 a.m.	G	40·1	44·8		50·9	52·4		65·1	62·2		48·9	42·2	
	S	40·2	45·0		50·7	51·7		64·7	61·8		49·1	42·5	
	M	40·2	44·9		51·0	52·0		65·3	62·3		49·4	42·4	
	S—G	+0·1	+0·2		−0·2	−0·7		−0·4	−0·4		+0·2	+0·3	
	S—M	0·0	+0·1		−0·3	−0·3		−0·6	−0·5		−0·3	+0·1	
3 p.m.	G	43·9	48·3		58·6	56·5		72·8	69·2		54·9	46·3	
	S	44·1	48·3		58·0	55·9		72·1	68·7		54·7	46·5	
	M	43·9	48·2		58·3	56·4		73·0	69·4		55·0	46·4	
	S—G	+0·2	0·0		−0·6	−0·6		−0·7	−0·5		−0·2	+0·2	
	S—M	+0·2	+0·1		−0·3	−0·5		−0·9	−0·7		−0·3	+0·1	
9 p.m.	G	40·2	43·3		47·2	47·9		59·2	56·2		45·9	40·2	
	S	40·5	43·6		47·7	48·3		59·9	56·9		46·4	40·6	
	M	40·5	43·5		47·8	48·4		60·0	57·1		46·5	40·6	
	S—G	+0·3	+0·3		+0·5	+0·4		+0·7	+0·7		+0·5	+0·4	
	S—M	0·0	+0·1		−0·1	−0·1		−0·1	−0·2		0·0	0·0	
Max.	G	46·5	50·6	44·7	60·6	60·0	66·4	75·6	72·1	67·8	57·8	49·6	41·5
	S	46·9	51·1	44·2	60·4	58·8	64·9	74·4	71·2	67·0	57·7	49·6	41·2
	M	46·6	51·1	44·6	60·4	59·2	65·7	75·2	71·8	67·5	57·5	49·4	40·9
	S—G	+0·4	+0·5	−0·5	−0·2	−1·2	−1·5	−1·2	−0·9	−0·8	−0·1	0·0	−0·3
	S—M	+0·3	0·0	−0·4	0·0	−0·4	−0·8	−0·8	−0·6	−0·5	+0·2	+0·2	+0·3
Min.	G	35·6	40·1	32·9	40·6	42·9	44·7	51·1	48·5	49·8	41·5	35·3	31·8
	S	36·3	40·6	33·1	41·3	43·4	45·6	51·6	49·0	50·5	42·1	36·1	32·2
	M	36·3	40·7	33·5	41·7	43·8	46·0	52·2	49·7	50·8	42·5	36·4	32·7
	S—G	+0·7	+0·5	+0·2	+0·7	+0·5	+0·9	+0·5	+0·5	+0·7	+0·6	+0·8	+0·4
	S—M	0·0	−0·1	−0·4	−0·4	−0·4	−0·4	−0·6	−0·7	−0·3	−0·4	−0·3	−0·5

TABLE D.

SHOWING for the SEVERAL SEASONS the different RESULTS for THREE TYPICAL SCREENS, during the prevalence of (*a*), BLUE SKY; (*b*), OVERCAST SKY; and (*c*), ALL ASPECTS of the SKY.

OBSERVATIONS.		WINTER.		SPRING.		SUMMER.		AUTUMN.		TOTALS.	MEAN.	NOTES.
		Jan.	Feb.	April.	May.	July.	Aug.	Oct.	Nov.			
9 a.m.	S—G	+0·6	+0·5	0·0	−0·4	−0·4	−0·3	+0·4	0·0	+0·4	+0·1	Blue sky.
		0·0	0·0	−0·3	−0·1	−0·4	−0·3	−0·2	0·0	−1·3	−0·2	Overcast sky.
		+0·1	+0·2	−0·2	−0·7	−0·4	−0·4	+0·2	+0·3	−0·9	−0·1	All aspects of sky.
	S—M	+0·1	0·0	−0·6	−0·8	−0·7	−0·5	−0·4	−0·2	−3·1	−0·4	Blue sky.
		0·0	0·0	−0·3	−0·2	−0·5	−0·3	−0·2	−0·1	−1·6	−0·2	Overcast sky.
		0·0	+0·1	−0·3	−0·3	−0·6	−0·5	−0·3	+0·1	−1·8	−0·3	All aspects of sky.
3 p.m.	S—G	+0·6	0·0	−0·8	−0·8	−0·5	−0·4	0·0	+0·2	+1·7	+0·2	Blue sky.
		+0·2	0·0	−0·3	−0·7	−0·8	−0·6	−0·6	+0·2	−1·5	−0·2	Overcast sky.
		+0·2	0·0	−0·6	−0·6	−0·7	−0·5	−0·2	+0·2	−2·2	−0·3	All aspects of sky.
	S—M	+0·3	+0·1	−0·6	−0·9	−1·0	−0·6	−0·3	0·0	−3·0	−0·4	Blue sky.
		+0·1	+0·1	−0·1	−0·2	−0·6	−0·4	−0·3	+0·2	−1·4	−0·2	Overcast sky.
		+0·2	+0·1	−0·3	−0·5	−0·9	−0·7	−0·3	+0·1	−2·2	−0·3	All aspects of sky.
9 p.m.	S—G	+0·6	+0·6	+1·1	+0·7	+0·8	+0·8	+0·7	+0·8	+6·1	+0·8	Blue sky.
		+0·1	−0·1	+0·2	+0·2	+0·5	+0·9	+0·3	+0·2	+2·3	+0·3	Overcast sky.
		+0·3	+0·3	+0·5	+0·4	+0·7	+0·7	+0·5	+0·4	+3·8	+0·5	All aspects of sky.
	S—M	+0·1	0·0	−0·1	−0·3	−0·4	−0·2	0·0	0·0	−0·9	−0·1	Blue sky.
		+0·1	−0·1	−0·1	−0·1	+0·3	−0·2	−0·1	0·0	−0·2	0·0	Overcast sky.
		0·0	+0·1	−0·1	−0·1	−0·1	−0·2	0·0	0·0	−0·4	−0·1	All aspects of sky.
Maximum.	S—G	+0·4	−0·4	−0·1	−0·6	−1·1	−0·7	0·0	0·0	−2·5	−0·3	Blue sky.
		0·0	0·0	−1·0	−1·7	−1·4	−1·5	−1·1	−0·6	−7·3	−0·9	Overcast sky.
		+0·4	+0·5	−0·2	−1·2	−1·2	−0·9	−0·1	0·0	−2·7	−0·3	All aspects of sky.
	S—M	0·0	+0·1	−0·1	−0·2	−0·9	−0·6	+0·2	+0·4	−1·1	−0·1	Blue sky.
		0·0	0·0	−0·3	−0·9	−0·7	−0·6	−0·1	+0·1	−2·5	−0·3	Overcast sky
		+0·3	0·0	0·0	−0·4	−0·8	−0·6	−0·2	−0·2	−1·9	−0·2	All aspects of sky.
Minimum.	S—G	+0·5	+0·8	+0·7	+0·6	+1·0	+1·0	+0·8	+0·8	+6·2	+0·8	Blue sky.
		+0·7	+0·9	+0·4	+0·4	+0·7	+0·5	+0·6	+0·7	+4·9	+0·6	Overcast sky.
		+0·7	+0·5	+0·7	+0·5	+0·5	+0·5	+0·6	+0·8	+4·8	+0·6	All aspects of sky.
	S—M	−0·3	−0·2	−0·5	−0·7	−0·9	−0·8	−0·4	−0·5	−4·3	−0·5	Blue sky.
		−0·4	−0·1	−0·3	−0·3	−0·5	−0·8	−0·5	−0·3	−3·2	−0·4	Overcast sky.
		0·0	−0·1	−0·4	−0·4	−0·6	−0·7	−0·4	−0·3	−2·9	−0·4	All aspects of sky.

TABLE E.

SHOWING for the SEVERAL SEASONS and for THREE TYPICAL SCREENS the MEAN TEMPERATURE of the AIR, as deduced (1) from the 9 A.M. and 9 P.M. READINGS, and (2) from the MAXIMUM and MINIMUM READINGS recorded *during all Weathers.*

OBSERVATIONS.		MONTHS.												MEANS OF ALL.
		Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
														8 months.
Means of 9 a.m. and 9 p.m. Readings.	G	40·2	44·1	—	49·1	50·2	—	62·1	59·2	—	47·4	41·2	—	49·2
	S	40·3	44·3	—	49·2	50·0	—	62·3	59·4	—	47·8	41·6	—	49·4
	M	40·3	44·2	—	49·4	50·2	—	62·7	59·7	—	48·0	41·5	—	49·5
														12 months.
Means of Maximum and Minimum.	G	41·1	45·4	38·8	50·6	51·0	55·6	63·4	60·3	58·8	49·7	42·5	36·7	49·5
	S	41·5	45·9	38·7	50·9	51·1	55·3	63·0	60·1	58·8	49·9	42·9	36·7	49·6
	M	41·5	45·9	39·1	51·1	51·5	55·9	63·7	60·8	59·2	50·0	42·9	36·8	49·9

TABLE F.

SHOWING for the SEVERAL SEASONS and for the THREE TYPICAL SCREENS the COMPARISONS of the MAXIMA and MINIMA with the 3 P.M. and 9 P.M. READINGS, respectively, *during all Weathers.*

OBSERVATIONS.		WINTER.		SPRING.		SUMMER.		AUTUMN.		TOTALS.	MEANS.
		Jan.	Feb.	April.	May.	July.	Aug.	Oct.	Nov.		
Excess of Maximum below 3 p.m. reading.	G -	+2·6	+2·3	+2·0	+3·5	+2·8	+2·9	+2·9	+3·3	+22·3	+2·8
	S -	+2·8	+2·8	+2·4	+2·9	+2·3	+2·5	+3·0	+3·1	+21·8	+2·7
	M -	+2·7	+2·9	+2·1	+2·8	+2·2	+2·4	+2·5	+3·0	+20·6	+2·6
	S—G -	+0·2	+0·5	+0·4	−0·6	−0·5	−0·4	+0·1	−0·2	− 0·5	−0·1
	S—M -	+0·1	−0·1	+0·3	+0·1	+0·1	+0·1	+0·5	+0·1	+ 1·2	+0·2
Defect of Minimum below 9 p.m. reading.	G -	−4·6	−3·2	−6·6	−5·0	−8·1	−7·7	−4·4	−4·9	−44·5	−5·6
	S -	−4·2	−3·0	−6·4	−4·9	−8·3	−7·9	−4·3	−4·5	−43·5	−5·4
	M -	−4·2	−2·8	−6·1	−4·6	−7·8	−7·4	−4·0	−4·2	−41·1	−5·1
	S—G -	−0·4	−0·2	−0·2	−0·1	+0·2	+0·2	−0·1	−0·4	− 1·0	−0·2
	S—M -	0·0	−0·2	−0·3	−0·3	−0·5	−0·5	−0·3	−0·3	− 2·4	−0·3

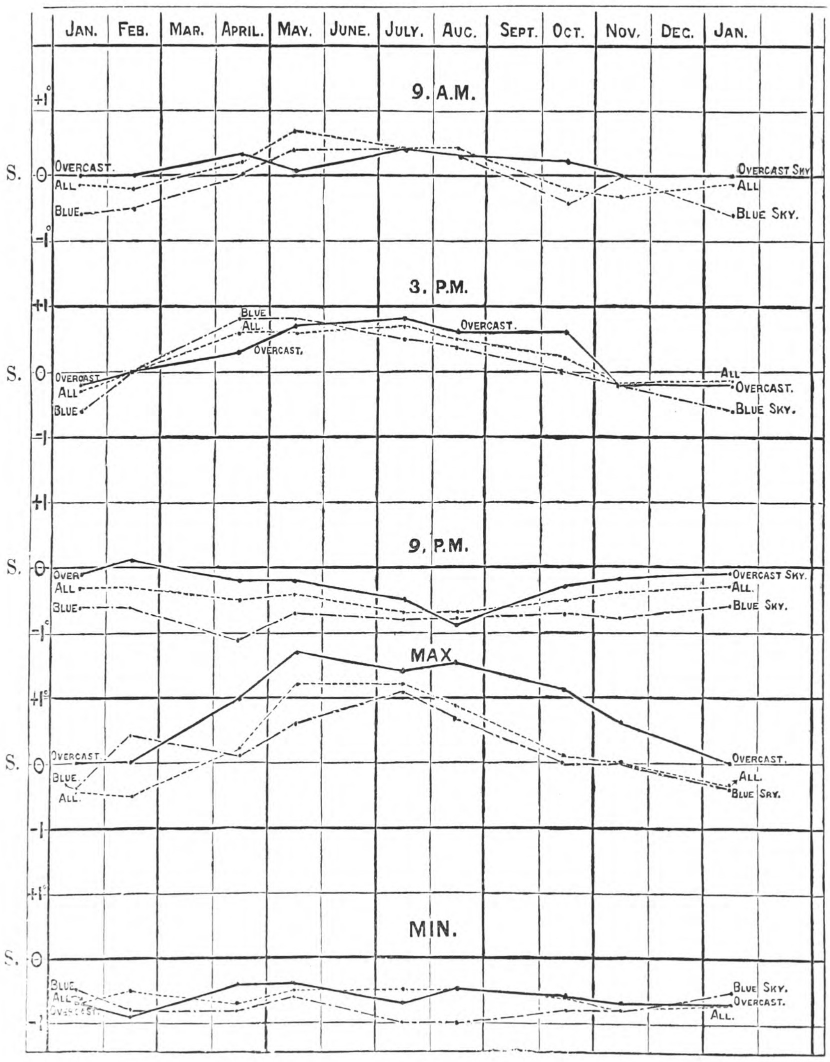
TABLE G.

SHOWING the EFFECT of the DIFFERENT SCREENS on the MEAN TEMPERATURES for the WHOLE YEAR. The figures for GREENWICH derived from the "REDUCTION of the GREENWICH METEOROLOGICAL OBSERVATIONS" are given for purposes of comparison.

Names of Screens.	Mean of Observations made at				Means of		
	9 a.m.	Maximum.	9 p.m.	Minimum.	9 a.m. and 9 p.m.	Maximum and Minimum.	All.
Glaisher (8 months) -	50°·8	59°·1	47°·5	42°·0	49°·2	50°·6	49°·9
Stevenson (do.) -	50·7	58·8	48·0	42·6	49·4	50·7	50·1
Martin (do.) -	50·9	58·9	48·1	42·9	49·5	50·9	50·2
Greenwich (8 months for 20 years) -	50·3	55·4	48·3	45·1	49·3	50·3	49·6

FIG. 13 (in illustration of Table D.)

SHOWING the DIFFERENCE between the READINGS recorded on the GLAISHER'S and the STEVENSON'S STANDS; STEVENSON'S being taken as the Standard.



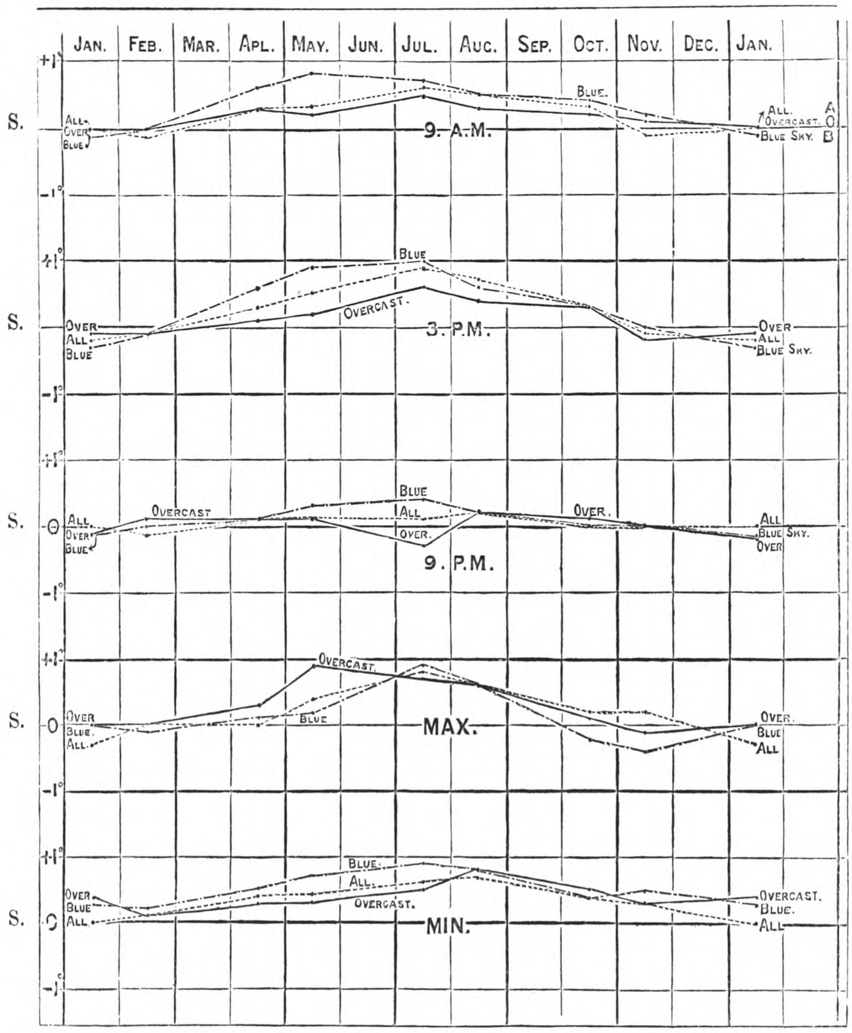


Fig. 14 (in illustration of Table D.)

Showing the Difference between the Readings recorded on the Martin's and the Stevenson's Stands; Stevenson's being taken as the Standard.

APPENDIX No. III.

Report on Hygrometric Methods; First Part, including the Saturation Method and the Chemical Method, and Dew-point Instruments. —By W. N. Shaw, M.A.

Reprinted from Philosophical Transactions, vol. 179, 1888.

In August, 1879, at the request of the Meteorological Council, I undertook an experimental comparison of the various methods of determining the hygrometric state of the air, with the following instruction, "The chemical method to be employed, and with it to be compared the dry-and-wet-bulb hygrometer, Regnault's, Dines', Alluard's, and the hair hygrometer." Since that time I have devoted to the subject the time that was at my disposal, and I now beg leave to lay before the Council a statement of the experiments I have made and the results I have arrived at with respect to the chemical method and the dew-point instruments.

The arrangement of the experiments was left to my discretion; I had, therefore, first to practise myself in the use of the different methods in order to arrange in some sort of order the means by which the various inquiries should be undertaken; and, further, it was necessary for me to know and to carefully consider the very numerous contributions made by other observers to the discussion of hygrometric methods, so that I might be able to distinguish between those points which had been satisfactorily and permanently settled and those upon which further experimental investigation might throw additional light. The distinction proved to be not a very easy one to draw, and I shall therefore append to this report a summary of the work done in the subject since the time of Daniell. I made a summary of this kind for my own use at the outset, but since then many important memoirs have been published, chiefly on the Continent, which bear particularly upon the question of the trustworthiness of observations with the wet and dry bulb. I have taken account of those memoirs in the summary which I now offer. It will, I believe, be found to justify the following general conclusions.

1. There is no hygrometric method of which it has been *proved* that an observer following out definite written instructions with due care and skill can obtain measurements of vapour pressure which are accurate to within 1 per cent. The accuracy claimed by Regnault for the chemical method is only "about a fiftieth," and to this method authors nearly always refer, as being the ultimate standard of reference for the other methods. There is no evidence to show that, speaking generally, the various absolute hygrometers, such as those of Schwackhöfer, Edelmann, Neesen, Dines, and others, can be relied upon to that degree ot accuracy, whatever may be done by one particular observer after laborious trial and testing with one particular instrument.

2. It is possible by the use of suitable desiccating tubes to absorb the moisture from air passed through them, and thereby to determine the weight of water contained in the air *which actually passes over* the desiccating substances. The degree of accuracy attainable in this measurement is limited only by the uncertainty of the weight of the drying tubes. As the drying tubes are somewhat bulky and their weights are liable to alterations in consequence of variations in the state of their external surface, this uncertainty is quite appreciable. No data are given with regard to it by Regnault or other observers who have employed the method. From a number of experiments of my own I may, however, conclude that it is not safe to assign an accuracy to the weighings greater than that of 1 milligramme, but that with due precautions this limit need not be exceeded. This may, of course, be the same, whatever the total amount of moisture absorbed may be, and the fractional error will therefore depend upon that total amount of moisture. If one gramme be taken up, the limit of error will be one part in one thousand, so that an accuracy of 1 per cent. is well within the reach of an observer.

3. Air may be saturated by vapour arising from water in a vessel with glass sides so that the vapour pressure reaches a value agreeing to within about 2 per cent. with the vapour pressure *in vacuo* at the same temperature. There are no observations to show whether a still closer approximation to the vacuum

saturation-pressure would be obtained by using air drawn from an enclosure surrounded by wet muslin. Regnault's experiments bearing upon this question do not give a decisive answer, in consequence of complications arising from the uncertainty as to the density of saturated vapour, and the effect of the glass.

4. The dew-point instruments, in the hands of skilled observers, give readings of the so-called dew-point which are sensitive to within 0°·1 C., but the reading may depend on the skill of the observer, and there is no evidence to show within what limits of accuracy the temperature so observed may be regarded as the true saturation temperature of the air. Suggestions have been made as to causes of error, but no measurements of the effects of those causes have been made which would enable an observer to specify the degree of accuracy of the inferences from his observations.

5. With reference to the wet-and-dry-bulb method, two points are clear:—(i.) Different observers use different tables* for the reduction of their observations and in certain cases these different reductions lead to very serious differences of results; (ii.) The ordinary method of exposure when the two thermometers are freely exposed, without any provision for a definite circulation of the air, cannot be expected to give results which are accurate to within 2 per cent.; in fact no satisfactory formula of reduction can be found.

The errors are especially serious when the air is nearly or quite saturated and the wet bulb coated with ice.

The most accurate results with this method are obtained when an artificial circulation of air is maintained, and in that case the highest accuracy claimed for the method allows an error of ±2 per cent. with temperatures above zero, and twice that amount with lower temperatures, the comparisons being made with Alluard's form of Regnault's dew-point instrument.

6. The case of the hair hygrometer is very perplexing; opinions are very conflicting, and it seems to be a question upon which meteorologists take sides. An immense amount of experimental work has been done, and it is possible that an observer might make very useful observations with the instrument, but whether the inferences from his observations would be regarded with any degree of confidence by others seems to be still an open question.

With the exception of Regnault's researches on the chemical method (page [71]), the experimental work that has hitherto been published has consisted in the simultaneous observation of the vapour pressure in free air by two different hygrometric methods. This plan is open to uncertainties arising from the two following causes:—

(i.) The air is taken from two different positions for the two instruments; in other words, the observations are made upon two different specimens of air whose hygrometric states are *assumed* to be identical, not upon the same air. Perhaps the assumption is sufficiently justified when the air has immediate access to the reading parts of each instrument, but I have pointed out in the summary of results certain reasons for considering this uncertainty to be serious when the access is not direct, as in the case of the comparison of a dew-point instrument with a ventilator-psychrometer, in which case the air may suffer alteration in passing over the vanes of the ventilator. And indeed in any case, in an experiment designed to compare the efficiency of different methods, the uncertainty arising from this cause is a disadvantage, for the liability to error in the instruments themselves is quite sufficient to make the comparisons difficult; and moreover, if we could rely upon the identity of the results of two instruments, a similar arrangement might be employed to determine whether there is any local variation in the hygrometric state of the air, an independent question not without interest.

(ii.) The observations obtained with different instruments differ in character. The chemical method gives the mean value of the vapour pressure during the period of the experiment, and does not indicate any small variations from time to time. The wet bulb takes a certain finite, though it may be short, time to reach its equilibrium state, and therefore does not give the vapour pressure at any particular instant. The dew-point instrument, on the other hand, may be taken as giving the vapour pressure at the instant of the formation of the dew deposit. These differences may, perhaps, best be illustrated by considering what would be their effects upon the ideal curve which would represent the continuous variation of the hygrometric state of the air, if we suppose the air to be subject to a series of rapid alternations of moisture and dryness; the dew-point instrument would give a series of points on the true curve; the observations with the wet and dry bulb would give a series of points, not on the true curve, but a somewhat modified curve, the slopes being more gradual, and provided the alternations were sufficiently rapid, the curve of the wet bulb would generally be smoother than the true curve. A series of observations with the chemical method would give a series of points on a third curve quite different from the other two, and one from which all effect of rapid alternations would have disappeared, and only the more permanent changes would be shown. Hence two instruments of different kinds can only be compared by taking the mean of a number of consecutive observations, and assuming that the effect of all rapid alternations disappears, and this is probably the case under all ordinary circumstances. This must, however, be borne in mind in considering the comparisons, because the rapid alternation is possibly of not infrequent occurrence. When using a dew-point instrument it is sometimes observed that at the same temperature the dew forms and then disappears again. This phenomenon has been differently interpreted by different observers, some considering that it shows the extreme sensitiveness of the instrument to small atmospheric changes, while others have attributed it to the variation of the observed dew-point with variation of wind velocity (see page [82]).

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* See Note D., page [85].

It is therefore evident that it would be of some advantage to eliminate if possible these two causes of uncertainty. I have endeavoured to do so in the experiments I am now communicating, in the following manner: The instrument to be tested was enclosed in a glass vessel B, which was connected on the one side with an apparatus, which I will call a saturator, A, designed to saturate air at a given known temperature, and on the other side with drying tubes, C. An aspirater drew air through the whole arrangement. The hygrometric state of the air is given (1) by the temperature of the saturator, A; (2) by the instrument; (3) by the drying tubes C. I first ascertained (§ 1 to § 10) that when B was cut out and A and C put in immediate connexion, the two methods, namely, the saturation method and the chemical method, gave concordant results. Then B was introduced, but the dew-point instrument was not worked, and the results of A and C were again compared and found to be equally concordant. This showed that the state of the air was not altered by the mere presence of B; and, finally, observations were taken with the dew-point instrument while the air was being drawn through, and the results of A and C were again compared. It was found that they were still concordant, and since the state of the air was known before it passed over the instrument, and was proved to be the same after passing the instrument, we are quite safe in assuming the hygrometric state of the air while it was passing the instrument to be that given either by the saturater A *or* by the drying tubes C. Hence observations made with the instrument may quite fairly be taken to be observations upon air whose hygrometric state is really accurately known; the degree of accuracy will be clear from the particulars of the experiments. The experiments accordingly group themselves in the following manner:—

I. Experiments to ascertain the limits of accuracy of agreement between the method of saturation and the chemical method.

These experiments are practically a repetition of Regnault's work with my arrangement of the apparatus and absorbent substances. This repetition is necessary (1) as a preliminary, in order to make sure that the apparatus is in satisfactory working order, and as a test of the drying substances used (Table II.), (2) because Regnault's observations were undertaken with the view of determining the density of vapour in saturated air, and nearly always the air was practically saturated when it reached the drying tubes. In order to complete our knowledge, we have to extend the observations to cases in which the temperature of the air when it reaches the tubes is considerably above the temperature of the saturator. In this case one would expect *à priori* that the agreement would be very nearly the same, but I know of no published experiments to directly test the point.

II. Experiments to determine whether the interposition of the vessel C interferes with the concordance of the results obtained. The only apparent reasons for such interference are condensation upon the connecting tube or the vessel C, or leakage from the dew-point instrument. The second part of I. may therefore be taken with these. The results of I. and II. are shown in Tables II. to V.

III. Comparisons of the results of the dew-point instrument with those of the saturator and chemical method when all three are taken together. (Table VIII.)

IV. Observations with the dew-point instrument compared with the results of the saturator only. A few such observations were made for the purpose of testing special points under circumstances that made the double testing of the air inconvenient or undesirable. (Exp. 73 to 83.)

I may now proceed to give the details of the experiments.

THE METHOD OF SATURATION AND THE CHEMICAL METHOD. TESTS OF THE EFFICIENCY OF THE APPARATUS AND OF THE DESICCATING SUBSTANCES.

§ 1. The method of saturation which is here referred to simply means passing air through some form of apparatus by which it is saturated, the temperature of saturation being read by a thermometer placed in the saturator. This is, of course, not a method of measuring the pressure of moisture in a given specimen of air, but simply a means of obtaining air the pressure of vapour in which is known from its temperature. The saturators used will be described later.

§ 2. The chemical method consists, as is well known, in causing a known volume, v, of air to pass through weighed tubes capable of abstracting *the whole* of the moisture from the air and determining the weight of aqueous vapour thus absorbed by the tubes. Then if f be the amount of moisture per cubic metre in the air which *enters* the tubes; Δ, the density of dry air at 0° C. and 760 mm. pressure; d, the specific gravity of aqueous vapour referred to dry air at the same temperature and pressure; t, the temperature of the entering air; α, its coefficient of expansion per degree centigrade; e, the pressure of the aqueous vapour, then

$$e = \frac{760\,(1 + \alpha\,t)}{\Delta\,d} f. \qquad (1.)$$

In order to determine the volume, v, of air which enters the tubes, a known volume of water is allowed to flow out of an aspirator, its place being taken by the air which passes through the drying tubes. Let V be the volume of water which is allowed to run out of the aspirator, this volume will then be occupied by *saturated* air, the dry part of which has passed through the drying tubes; if T be its temperature when in the aspirator, E the corresponding pressure of aqueous vapour, the pressure due to the dry air will be B – E, where B is the height of the barometer at the time. Its pressure before entering the tubes was B – e, and its temperature was t; its volume therefore was—

$$v = \mathrm{V} \cdot \frac{\mathrm{B}-\mathrm{E}}{\mathrm{B}-e} \cdot \frac{(1+\alpha\,t)}{(1+\alpha\mathrm{T})}$$

Hence, if w be the number of grammes of moisture absorbed,

$$f = \frac{w}{\mathrm{V}} \cdot \frac{\mathrm{B}-e}{\mathrm{B}-\mathrm{E}} \cdot \frac{(1+\alpha\mathrm{T})}{(1+\alpha\,t)}$$

and we get for determining e the following equation:—

$$e = \frac{760\,(1+\alpha\,t)}{\Delta\,d} \cdot \frac{w}{\mathrm{V}} \cdot \frac{\mathrm{B}-e}{\mathrm{B}-\mathrm{E}} \cdot \frac{(1+\alpha\mathrm{T})}{1+\alpha\,t} \qquad (2.)$$

or

$$\frac{e}{\mathrm{B}-e} = \frac{760}{\mathrm{B}-\mathrm{E}} \cdot \frac{(1+\alpha\,\mathrm{T})}{\mathrm{V}} \cdot \frac{w}{\Delta\,d}$$

$$= \frac{760\,(1+\alpha\,\mathrm{T})}{\Delta\,d} \cdot \frac{w}{(\mathrm{B}-\mathrm{E})\,\mathrm{V}}$$

$$\frac{e}{\mathrm{B}-e} = \mathrm{X}\frac{w}{(\mathrm{B}-\mathrm{E})\,\mathrm{V}}$$

$$\therefore \qquad e = \mathrm{X}\frac{w}{\mathrm{V}}\left(1 + \frac{\mathrm{E}-e}{\mathrm{B}}\right) \qquad (3.)$$

Approximately, neglecting squares not likely to be larger than $\frac{1}{6000}$.

or

$$e = \mathrm{X}\frac{w}{\mathrm{V}}\left(1 + \frac{\mathrm{E}-\frac{\mathrm{X}\,w}{\mathrm{V}}}{\mathrm{B}}\right) \text{ Approximately.} \qquad (4.)$$

The application of this formula involves the assumption of a value of d, the specific gravity of steam. The difficulties connected with this are discussed in the Note C. (p. [71]). The value ·622 has been assumed throughout my experiments. For X w/V inside the bracket the value of e derived from the temperature of the saturator may be substituted without appreciable error.

To facilitate computation I have tabulated the values of X, *i.e.* $\frac{760}{\Delta\,d}\,(1 + \alpha\,\mathrm{T})$, for each degree Centigrade as below:—

Fig. 1.

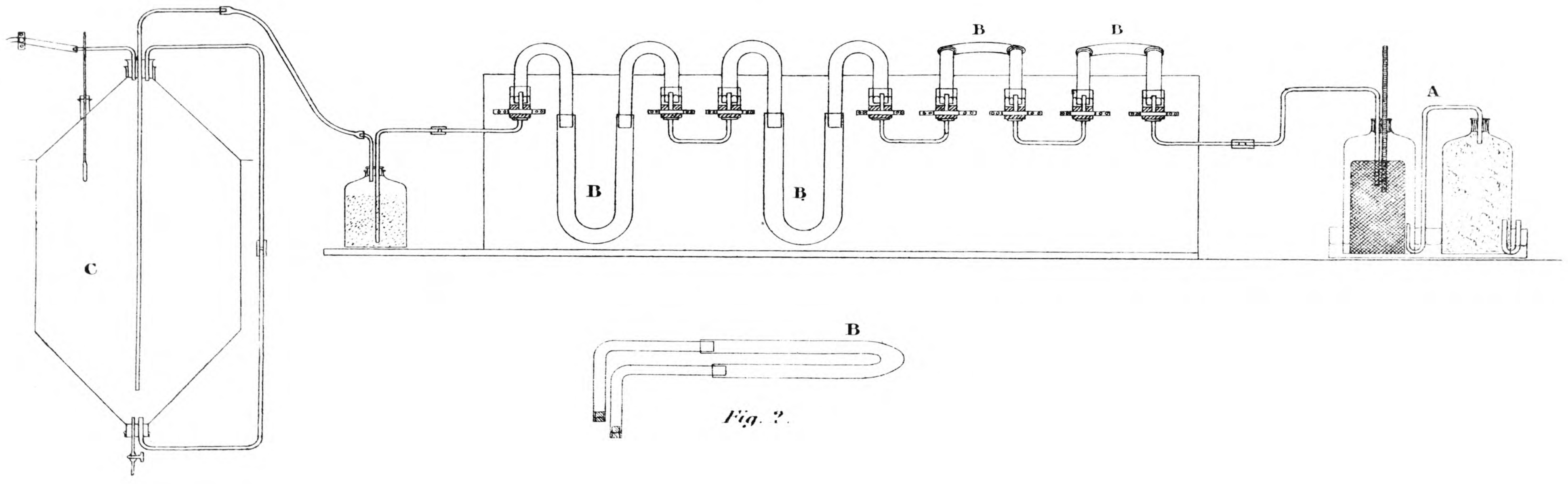

Fig. 2.

To face p.[45.]

DANGERFIELD LITH 22, BEDFORD ST COVENT GARDEN. 9.87.14802.

Table for Reduction of Aspirator Observations.

Table of the value of $\frac{760\,(1 + \alpha\,\mathrm{T})}{d\,\Delta}$ for every degree of temperature between -10° C. and $+30^{\circ}$ C.

$d = 0{\cdot}622$. $\Delta = 1293$ grammes per cubic metre. $\alpha = {\cdot}00366$.

Temperature T.	$\frac{760\,(1 + \alpha\,\mathrm{T})}{d\,\Delta}$.	Log.	Temperature T.	$\frac{760\,(1 + \alpha\,\mathrm{T})}{d\,\Delta}$.	Log.
−10°	·9104	$\bar{1}$ ·9592313	11°	·9830	$\bar{1}$ ·9925666
− 9	·9139	·9608781	12	·9865	·9949919
− 8	·9173	·9625187	13	·9899	·9956119
− 7	·9208	·9641531	14	·9934	·9971266
− 6	·9242	·9657813	15	·9969	·9986360
− 5	·9277	·9674035	16	1·0003	·0001402
− 4	·9311	·9690196	17	1·0038	·0016392
− 3	·9346	·9706298	18	1·0073	·0031330
− 2	·9381	·9722340	19	1·0107	·0046258
− 1	·9415	·9738525	20	1·0142	·0061054
0	·9449	·9754247	21	1·0176	·0075839
+ 1	·9484	·9770114	22	1·0211	·0090575
+ 2	·9519	·9785921	23	1·0245	·0105260
+ 3	·9554	·9801673	24	1·0280	·0119898
+ 4	·9588	·9817453	25	1·0314	·0134484
+ 5	·9623	·9833004	26	1·0349	·0149023
+ 6	·9657	·9848586	27	1·0383	·0163117
+ 7	·9692	·9864112	28	1·0418	·0177550
+ 8	·9726	·9879583	29	1·0542	·0191955
+ 9	·9761	·9894998	30	1·0487	·0206303
+10	·9796	·9910359			

The fraction $\frac{\mathrm{E}-e}{\mathrm{B}}$ is always small, and B has therefore always been taken equal to 760. The practical error thus introduced is only of the order ·00002.

§ 3. Before describing the apparatus first employed, it will be well to call attention to the temperature measurements. For this purpose I have been able to avail myself of eleven thermometers; of these, two by Negretti are the property of the Meteorological Office, graduated to half degrees Fahrenheit; two of my own, by Hicks, are graduated to fifths Centigrade; two by Hicks, graduated to fifths Fahrenheit, one by Hicks, graduated to fifths Centigrade, one by Cetti, graduated to fifths Centigrade, and three by Geissler, graduated to tenths Centigrade, are the property of the Cavendish Laboratory. All these thermometers were, through the kindness of Mr. Whipple, specially compared for me at Kew for every degree Centigrade in January 1882. Their freezing points have been determined from time to time and the tables of corrections revised. The temperature readings may be regarded as accurate to within $0^{\circ}{\cdot}1$ C.

§ 4. The apparatus used for the first series of experiments (Table II.), of which Fig. 1 shows the general arrangement, consisted of three distinct parts:—

(i.) The aspirator (C) for causing the passage of a known volume of air over the desiccating substances in the drying tubes.

(ii.) The weighed drying tubes (B, B) for determining by their increase of weight the quantity of moisture in a known volume.

(iii.) A saturator (A) for supplying saturated air at the temperature of the room.

Between the drying tubes and the aspirator was placed an additional drying tube, or a bottle filled with chloride of calcium, to prevent moisture reaching the weighed tubes from the aspirator.

(i.) *The aspirator* was of the ordinary form, a copper cylinder with conical ends; a tap was fixed at the bottom, and through a cork at the top passed three glass tubes, the first for the delivery of the air from the drying tubes passed nearly to the bottom of the aspirator to ensure a uniform flow of air; the second connected with a similar one entering at the bottom served as a gauge; the third passed to the lower surface of the cork and was used to fill the aspirator by being connected with an aspirating pump. The aspirator was also provided with a thermometer passing through the side of the upper cone.

The volume of each aspirator was determined by completely filling it with water as for an experiment, and running the water out gradually into a litre flask of known weight when empty, and weighing the flask each time when full, the flask being carefully dried by means of a hot cloth between successive fillings.

Two aspirators were employed marked A and B, and the quantity of water in each was determined twice with the following results:—

Aspirator A, 1st observation 16365·9 grammes, temperature 18° C.
2nd „ 16371·2 „ „
Aspirator B, 1st observation 16384·0 „ „
2nd „ 16383·8 „ „

We have, therefore, allowing for the density of the water used and the temperature,

Volume of A at 0° 16384 cc.
„ B at 0° 16400 cc.

The volumes at any temperature t will then be

Aspirator A, 16384 $(1 + {\cdot}000052\,t)$ cubic centimetres.
„ B, 16400 $(1 + {\cdot}000052\,t)$ „

One of these two gives the volume of water run out in any experiment. The water would be replaced partly by air which had come through the drying tubes and partly by the vapour of the water formed in the aspirator. *We may assume that the air in the aspirator at the end of the experiment is saturated with moisture.*

(ii.) *The drying tubes.*—A specially constructed form was used. Instead of being closed with corks perforated with glass tubes, glass connections of wider bore were used, which were thickened and ground into the U-tubes. These latter were of the ordinary size, about 6 inches long and ½-inch internal diameter. The long tubular stoppers were bent over, in the case of sulphuric acid and pumice tubes through two right angles, and in the case of phosphoric acid tubes (shown in Fig. 2) through one right angle. The wide ends of these tubes could then pass over narrower tubes coming vertically through the bottoms of small mercury cups, and thus forming the connections between the drying tubes and the other parts of the apparatus. The connections were thus made by means of mercury joints. These joints were tested, and found to be quite tight for differences of external and internal pressure many times greater than those occurring in the experiments. The arrangement is very convenient, as the tubes can be simply lifted from their places and as easily replaced; they require careful brushing to remove the adhering mercury, and the ends are closed for weighing with small india-rubber stoppers. The liability to error in consequence of moisture on the surface of the mercury is probably not so great as that to which the tubes would be exposed by using india-rubber connections. The drying tubes were filled either with phosphoric anhydride, or with rather coarse fragments of pumice saturated with the strongest sulphuric acid (sp. gr. 1·84). Experiments will be detailed below to show that either of these substances is perfectly efficient for the purpose of withdrawing all the moisture from the air passed over it. A number of experiments have shown me that drying tubes filled with recently fused chloride of calcium, although in many ways convenient, are not capable of extracting all the moisture from air.*

Correction of the weight of the drying tubes for weighing in air.—The main part of the weight of the tubes is the weight of the glass, and the specific gravity of the pumice and of the strong sulphuric acid does not differ much from that of glass; we may, therefore, calculate the correction for weighing in air on the assumption that the specific gravity of the whole tube is that of flint glass, which we may take to be 3·5. This would make the correction to weight *in vacuo* for a tube of 150 grammes equal to 30 milligrammes. The effect of a barometric variation of 1 c.m. upon such a tube would therefore be to alter its apparent weight by ·39 mgm., and a variation of 1° C. of temperature would produce an alteration of ·11 mgm. in the apparent weight. The changes in barometric pressure and temperature between two successive weighings may therefore be such as to cause the apparent weight of the tube to alter by a considerable fraction of a

---

* The experiments were of two kinds :—

(1.) Two chloride of calcium tubes were arranged in front of two sulphuric acid tubes and an aspirator-ful of saturated air passed through all four. The gain of weight in each of the four for three observations is given below :—

1st Tube. ($CaCl_2$.)	2nd Tube. ($CaCl_2$.)	3rd Tube. (H_2SO_4.)	4th Tube. (H_2SO_4.)
·2025 gm.	+ ·0010 gm.	+ ·0208 gm.	
·2220 „	·0000 „	+ ·0245 „	+ ·0013 gm.
·2226 „	·0000 „	+ ·0190 „	+ ·0000 „

(2.) The two aspirators were used to determine by two independent simultaneous observations the amount of moisture in the air of the room, first by pumice tubes, and secondly by chloride of calcium tubes. The amounts are given below :—

By Pumice Tubes.	By Chloride of Calcium Tubes.	Difference.
·1550 gm.	·1435 gm.	·0115 gm.
·1498 „	·1352 „	·0146 „

Since the above was written, I have found that previous observers have expressed the same opinion about calcium chloride. (See Andrews, Phil. Mag. iv., 1852, p. 330, and Müller-Erzbach, Deutsch. Chem. Gesellsch. Ber. 14, p. 1093.)

milligramme. Now the amount of moisture is determined by the difference of weight of the tube at the two weighings, and accordingly any error in the weighing, due to neglecting to correct for weighing in air, will be of the same absolute magnitude, and of very much greater relative importance, in the weight of moisture absorbed by the tube. The variations of pressure and temperature, however, between the successive weighings of the tubes during the observations were not sufficient to produce any appreciable effect upon the results.

(iii.) *The saturator.*—This part of the apparatus was similar in principle to that used by Regnault. Two long bell-jars stood in a shallow dish of distilled water; the one jar was filled with well-washed sponge, and the second contained a wire-frame covered with muslin, which, with it, stood in the water at the bottom of the dish. The air supplied to the aspirator was drawn by means of a glass tube passing through the cork in the top of the jar from the middle of the muslin cage, and close to the opening of the tube was the bulb of the thermometer, which also passed through the cork; the place of the air thus removed was supplied by air passing from the outside through the sponge vessel, and delivered into the second vessel outside the muslin cage. During an observation, which lasted generally about two hours, the thermometer was read every quarter of an hour by means of a telescope placed at some distance, in order to avoid any error of parallax, and the mean of the readings taken as the temperature of the saturated air. The muslin cage served to protect the thermometer from external radiation, as well as to ensure the complete saturation of the air.

§ 5. A series of observations was first made, with the view of testing the drying tubes and other parts of the apparatus. There were two points to be determined: first, whether the desiccating substances used could be regarded as completely drying the air passed over them*; and secondly, whether one drying tube was sufficient for the purpose, or two or more were necessary. For this purpose four drying tubes were mounted, two being filled with phosphoric anhydride in the ordinary form of white powder; the other two were filled with pumice moistened with commercial sulphuric acid (sp. gr. 1·84). The pumice was broken into coarse fragments, and before being used was saturated with sulphuric acid, and heated to redness.

The saturated air was then sent through all four tubes, and the gain in weight of each tube determined. From the *gain in weight of the first tube alone*, the pressure of vapour in the saturator was calculated by the formula—

$$e = \frac{760\,(1+\alpha t)}{\Delta d} \cdot \frac{w}{V} \cdot \frac{B-e}{B-E}\,\frac{1+\alpha T}{1+\alpha t},$$

and this was compared with the pressure as given by Regnault's table for the temperature indicated by the thermometer in the saturator, corrected by the table of Kew corrections, and a determination of the freezing-point during the course of the series of observations. The subjoined tables give the results obtained. Table I. is a specimen of the observations as they were taken, and Table II. gives the collected results.

TABLE I.

Experiment 10. Aspirator A.

Time.	Temperature of Saturator.	Temperature of Aspirator.	Barometer.	Weight of Pumice Tube I. II.	Weight of Pumice Tube III. IV.	Weight of Phosphoric Tube III. IV.
	°	°				
3·55	19·5			176·4613	177·5045	146·9780
4·10	19·5					
4·30	19·5					
4·44	19·45					
5·00	19·45					
5·30	19·45					
5·50	19·40	19·4	29·750	176·7315	177·5061	146·9798
Means and Differences.	19·46			·2702	·0016	·0018
Corrections.	−·12	−·3				

Tension of Vapour calculated from Tube I. II. 16·66 mm.

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* NOTE A., April 23, 1888.—I have assumed Regnault's investigation of the behaviour of sulphuric acid tubes ("Annales de Chimie," vol. 15, 1845) to be conclusive evidence that *his* acid was efficient for its purpose. His experiments were of two kinds. First, four sulphuric acid tubes were mounted "in series." The first two were at the ordinary temperature, the third at 0° C., and the fourth at −30° C. The first tube gained 1·235 gramme in weight when moist air was sent through the four; the weights of the other three tubes were unaffected. Secondly, air was dried by passing it through three sulphuric acid tubes, each one metre long, the third being in a freezing mixture. The dried air was then led through a weighted vessel containing moist sponge, and thence through two weighted sulphuric acid tubes. The first of these two took up 0·767 gramme of moisture, being precisely the same amount as that lost by the sponge vessel. My attention has lately been called to the papers by E. W. Morley ("Amer. Journ. Sci.," vol. 30, 1884, p. 140; vol. 34, 1887, p. 199), in which the question of residual moisture in air passed over sulphuric acid or phosphoric anhydride is more rigorously treated. It appears that the residual moisture would not appreciably affect the weighings in the observations here recorded, for sulphuric acid only leaves unabsorbed "not far "from a fourth of a milligramme of moisture in 100 litres of a gas," and "the moisture left unabsorbed by phosphorus pentoxide, if capable "of determination, may be very roughly stated as possibly a fourth of a milligramme in 10,000 litres."

TABLE II.

Number of Experiment.	Date.	Aspirator.	Gain in Weight Tube 1, in Grammes.	Gain in Weight Tube 2.	Gain in Weight Tube 3.	Gain in Weight Tube 4.	Mean corr^{d}. Temp. of Saturator (t).	Corr^{d}. Temp. of Aspirator (T).	Tension in mm. cal^{d}. from Tube 1.	Tension in mm. cal^{d}. from Temp. t of Saturator.	Difference.	Duration of Experiment.
			Phosphoric Acid.		Sulphuric Acid.		°	°				h. m.
1	July 4	B	·2915	−·0050	+·0048	+·0028	21·05	22·7	18·23	18·55	−·32	1 20
2	„ 4	A	·2928	+·0008	+·0117	+·0018	20·93	22·2	18·29	18·41	−·12	2 15
3	„ 6	„	·2916	+·0023	+·0080	+·0040	21·05	21·8	18·17	18·55	−·38	2 23
4	„ 7	„	·2944	+·0005	+·0011	−·0008	21·06	21·7	18·34	18·56	−·22	2 3
5	„ 7	„	·3074	+·0023	+·0033	+·0017	21·59	21·5	19·12	19·18	−·06	2 7
6	„ 9	„	·2931	+·0007	+·0022	+·0006	20·91	21·45	18·25	18·39	−·14	2 45
7	„ 9	„	·3020	−·0001	−·0002	−·0009	21·31	21·0	18·77	18·85	−·08	1 15
			Sulphuric Acid.		Phosphoric Acid.							
8	„ 10	„	·2870	+·0027	+·0019	—	20·64	21·2	17·85	18·09	−·24	3 2
9	„ 11	B	·2785	−·0005	+·0018	—	20·00	21·4	17·35	17·39	−·04	2 0
10	„ 13	„	·2702	+·0016	+·0018	—	19·34	19·1	16·66	16·70	−·04	1 55
11	„ 14	„	·2557	+·0013	+·0010	—	18·55	18·7	15·74	15·80	−·06	2 0
12	„ 12	„	·2682	+·0023	+·0013	—	19·08	?	16·53	16·53	−·00	2 0

In the first seven experiments the two phosphoric acid tubes were placed first, and in the last five the sulphuric acid tubes were in that position. The columns giving the increase of weight in the different tubes show that these nearly always gained a small amount, but that amount is very irregular and is about the same whether the phosphoric acid tubes or the sulphuric acid are placed first, and the calculated tension is in nearly every case within 1 p.c. of the tabulated tension. This being about the same error as that which occurs in Regnault's observations, we may take it that the first tube was sufficient to completely dry the air passed through it, and that the increase of weight in the other tubes was due to some other cause.

§ 6. The different connections were made partly by glass and partly by india-rubber tubing, and this suggested itself as a possible source of the observed differences. A number of observations were therefore taken with a view of determining how far this might be the case.

I. A glass tube about 5 feet long was mounted as a connection between two mercury cups; and air, first dried by passing through a phosphoric acid tube, was passed through the long glass tube and then through a sulphuric acid tube, and the weight of the latter determined before and after the passage of the air. There was accordingly nothing but the glass tube between the two drying tubes. The results were as follows for four experiments:—

Date.	Increase of Weight of the Sulphuric Acid Tube, in Grammes.
July 18 -	+·0029
„ 19 -	+·0002
„ 20 -	−·0004
„ 21 -	−·0002

It appears, therefore, that after the tube had been once dried no further increase of weight of the sulphuric acid tube occurred, and hence that, with due precaution, glass tubes may be used as connections without any fear of error.

II. The glass tube was replaced by an india-rubber tube 6 feet long, and similar observations taken, fifteen experiments being made. The sulphuric acid tube always gained in weight although every precaution was taken to keep the india-rubber tube dry between the experiments. The least amount of moisture was obtained when a second observation was taken, immediately after the completion of a first. The increase of weight of the sulphuric acid tube generally amounted to about 15 milligrammes. An india-rubber tube cannot therefore be used with any security for connecting two drying tubes.

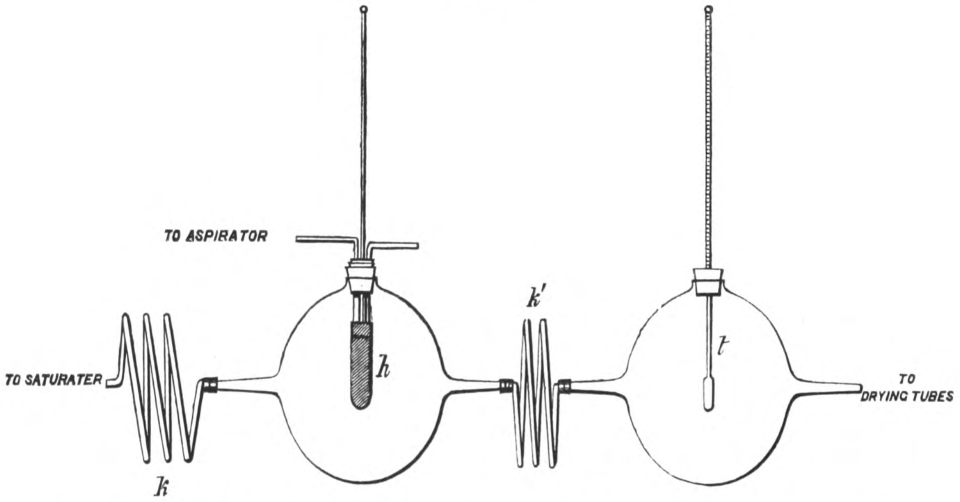
§ 7. We may accordingly conclude that the increase in weight of the drying tubes after the first, in the table of results given, was due for the most part to moisture derived from the india-rubber connections. For the last three observations in the table, p. [48], these connections were made as short as possible so that the amount of india-rubber surface exposed to the dry air might be small. With the apparatus in that form the drying tubes gained very much less in weight than before, and we may give the results obtained from these three observations as instances of the accuracy which may be expected by this method.

THE METHOD OF SATURATION AND THE CHEMICAL METHOD.—EXPERIMENTS WITH UNSATURATED AIR.

§ 8. With the experience gained by the experiments just described, I proceeded to arrange the apparatus by which the result of the chemical method could be compared with that of the saturation method in unsaturated air, and by which, moreover, dew-point observations could also be taken during the progress of an experiment such as those described. At first a Regnault dew-point instrument alone was introduced.

It was fixed by means of its glass tube into the cork of a three-necked globe in a manner which will be sufficiently indicated by a glance at the figure (Fig. 3); on each side of the globe, between its long horizontal neck and the rest of the apparatus, was attached a coil of copper tube to ensure that the temperature of the internal air was the same as that of the external, except in the vessel containing the hygrometer itself; attached to the second copper coil was a second globe with three necks, which contained a thermometer inserted in exactly the same manner as the Regnault hygrometer, and likewise shown in the figure. This sequence, consisting of (1) a copper coil k (Fig. 3), (2) a globe containing the hygrometer, h, (3) a copper coil, k', (4) a globe containing a thermometer, t, was simply interposed between the saturator and the aspirator, so that the air passed through the whole series.

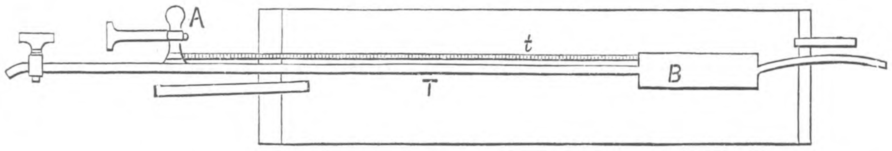
FIG. 3.



In order to fit the Regnault thimble tightly into the globe it was cemented, by means of gelatine, to a glass tube, over which it would just slip. This was found not to be quite tight when there was a considerable difference of pressure between the inside and outside, and the leakage might have interfered with some of the observations. The joint was therefore strengthened by lapping the line of junction of the silver and glass with pure india-rubber strip pulled very thin and having each successive layer painted over with benzene. After a sufficient thickness was lapped on, the whole was painted with a solution of india-rubber in benzene and varnished, and no further trouble was caused by any leakage at the joint except in the five experiments noted in Table VI.

Subsequently a Dines hygrometer enclosed in a cylindrical glass tube, Fig. 4, was added to the apparatus immediately following the globe containing the Regnault. The metal box, connecting tube, and thermometer of the Dines were detached from the wooden frame in which they are usually mounted. The delivery end of the tube was easily slipped through a piece of thick india-rubber sheet forming a stopper to the 3-inch glass cylinder, and the other end, having the tube and thermometer very close together, was enclosed by half slitting an india-rubber bung previously carefully drilled, the slit passing across the common diameter of the two drilled holes; the half slit bung was then slipped on the tube and thermometer, carefully pressed together with shellac varnish, and the bung coated with varnish and pressed home. It is perhaps surprising that there was no leak, but repeated tests showed that the Dines was in this way fixed air-tight in the cylinder. At first a leakage took place where the blackened glass of the instrument was fixed into the metal box. This was closed by painting round the edge with a solution of india-rubber in benzene, and after a good thick layer had been formed it was varnished with shellac varnish.

FIG. 4.



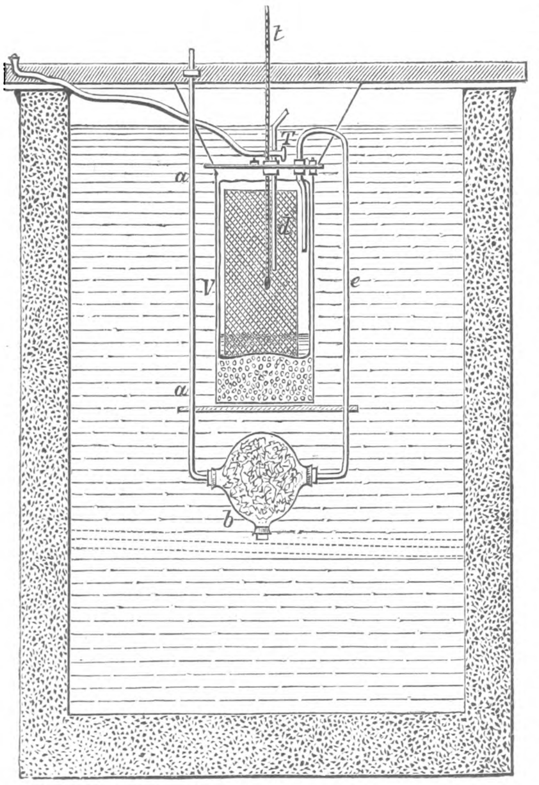
These dew-point instruments were sometimes excluded, the Regnault by withdrawing the hygrometer and filling up the neck of its globe with a bung, the Dines by removing the cylinder altogether.

All the connections between the different parts of the apparatus were made by glass and very short pieces of india-rubber tubing carefully wired and varnished.

The rest of the apparatus was similar to that already described, but was modified in the following details:—

i. *The Saturator.*—This was required to saturate air at a temperature below that of the room. For this purpose a large galvanized iron water tank jacketed with 3 inches of sawdust in a second galvanized iron tank was introduced to form a bath in which the saturator could be completely immersed. The saturator proper will be understood by reference to Fig. 5. The glass tube *a* was open to the external air, and led to a spherical glass vessel, *b*, filled with moist sponge; from this vessel a bent glass tube, *e*, led through a cork to the interior of the copper cylindrical vessel, V, through a metal lid bolted to it, and made air tight by an india-rubber washer round the rim. The vessel V was loaded with shot so that the whole apparatus just sank in water, and above the shot was a thin glass cylinder containing a layer of water at the bottom, in which stood a wire frame covered with well-washed muslin. The tube *e* opened into the vessel V outside the muslin frame, but inside the glass. The air was drawn out of the interior of the vessel through the tube *d*, close to which was the bulb of a thermometer; the tube *d* was the extension of a glass three-way tap T, which was fixed just outside the copper vessel; by it I could send air through the rest of the apparatus without its passing through the saturator, and thus dry the connecting tubes, &c. when necessary. This part of the apparatus was immersed in water, in the final experiments so that the tap was covered, (the projecting nozzle being extended by an india-rubber tube), in the tank already spoken of, and the temperature of the water therein reduced by stirring ice in it to any required extent.

FIG. 5.



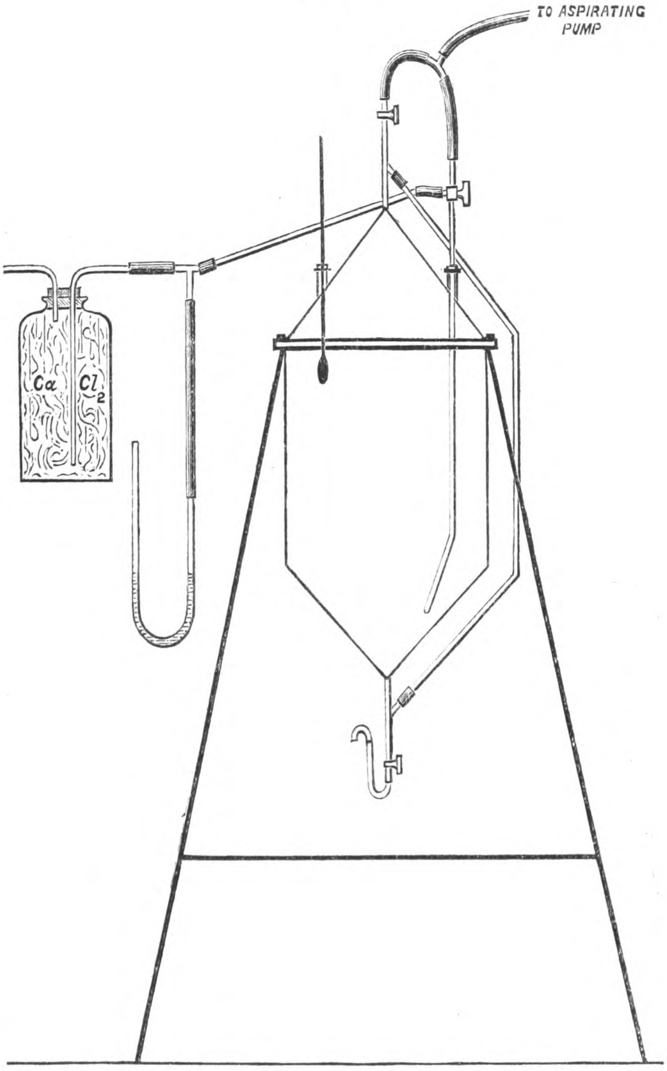
One-tenth natural size.

ii. *The Drying Tubes.*—Two sulphuric acid or two phosphoric acid ones were used for the observations. These remained as before, except that the connections (see Fig. 1) between them were made by glass tubes and shortened as much as possible. The ends of the connecting tubes coming through the mercury cups were moreover covered with little glass caps between the observations to protect them from damp during that time.

With these precautions it was assumed that any deposit received in the second tube ought to be added to that in the first tube, and this departure from the practice adopted in the first series of experiments is further justified by the fact that the new aspirator, which will be described presently, more than doubled each of the old ones in volume, so that the tubes had to take up twice the quantity of moisture (for the same temperature) and in the same time as that required for the smaller amount in the previous series. The variable amounts of moisture received by the second tube showed that this part could not be neglected (see § 15).

ii. *The Aspirator.*—The pattern of this was similar to those already described, but its volume was more than twice as great, and provision was made for increased accuracy in reading; it is accordingly figured in Fig. 6. Between it and the rest of the apparatus there was, moreover, a water-pressure gauge attached, which was found very useful, first, as a test of the tightness of the joints of the apparatus; and, secondly, to see that communication was quite free between all the parts. The larger aspirator was used, as it was intended to supply in some cases comparatively dry air, and a larger volume was required to avoid the effect of errors of weighing.

FIG. 6.



One-tenth natural size.

Two determinations of the capacity of the new aspirator were made on the same plan as for the old ones, see page [45], with the following results:—

1st observation, 35987·44 grammes of water at 12°·7 C.
2nd „ 35989·28 „ „ 12°·2 „

These corrected for temperature expansion of water and copper, give volumes—

(1.) 36049·33 c.c. at 15° C.
(2.) 36049·73 „ „ „

Mean - 36049·53 c.c. at 15° C.

The volume of the aspirator is therefore at t°

$$= 36049 \cdot 5\left\{1 + \cdot 0000525\,(t - 15)\right\}$$

§ 9. We have first to discuss the comparison of the results given by the saturator with those of the chemical method for air which is not saturated.

The apparatus was mounted on November 7 with the Regnault dew-point instrument in position, and the first four observations were wasted by the washer between the copper cylinder and its lid being cut through and letting the water in. It was put in order again on November 17, and gave no trouble afterwards. An observation was taken with the temperature of the water as it stood in the tank with the following result:—

No. 5. November 17. Vapour pressure, by saturator - - 10·63 mm.
„ „ chemical method - 10·65 „

Difference - +·02 mm.

Temperature of air, 12°·98 C.

Ice was then added, and when it was melted a second observation was taken as follows:—

No. 6. November 19. Vapour pressure, by saturator - - 8·54 mm.
„ „ chemical method - 8·59 „

Difference - +·05 mm.

Temperature of air, 14°·74 C.

These results seemed to give quite satisfactory agreement between the two indications of the states of the air. Passing over No. 7, the next five, however, gave results which were increasingly divergent, viz.:—

TABLE III.

No.	Date.	Temperature of Saturator.	Temperature of Air.	Pressure by Saturator.	Pressure by Chemical Method.	Difference.
8	Feb. 9	11°·76	14°·91	10·27	10·42	+ ·15
9	„ 9	11·92	18·08	10·38	10·75	+ ·37
10	„ 11	13·14	15·83	11·24	11·84	+ ·60
11	„ 12	13·07	14·37	11·18	12·20	+1·02
12	„ 14	13·43	—	11·45	13·30	+1·85

§ 10. I was unable at first to assign any cause for this increasing difference, and thought that in No. 9 it might be due to the air being supersaturated in passing into the saturator, so in the next experiment, No. 10, I passed the air through a tube of ice before it entered the vertical tube *a* of the saturator (Fig. 5). I tried, moreover, whether it was due to the action of the carbonic acid of the air, and interposed a potash tube in No. 11, but neither of these trials showed that the cause was discovered. The next observation, however, furnished an explanation. The temperature of the saturator was above that of the air, and the chemical method gave a result ·53 mm. below that of the saturator. On inspecting the connecting tubes I found a very fine deposit of dew upon them, and, as the apparatus was left in connexion with the saturator during the night, I have no doubt that during the cold part of the night the vapour was condensed in the connecting tubes, and that these were not dry when the observations marked 8 to 12 were made, although I took the precaution of running dry air through them, generally for a quarter of an hour before each experiment. Thenceforward the connecting tube was left in communication, by means of the three-way tap, with a calcium chloride bottle overnight, and the tubes were dried more carefully before the observations. The next set of four observations, however, showed that the amount of moisture in the drying tubes was still too great, the pressure differences being ·11, ·20, ·20, ·40 mm. respectively. I then thought that the dew-point instrument might be producing some effect by leakage or otherwise, and acccordingly removed it, intending to find out the cause of the differences if possible. The temperature of the bath was reduced by ice to 9°·96 C., and the observation showed a difference of ·07 mm. only. More ice was added, and the temperature reduced to 7°·39 C.: the difference at that observation was 0·09 mm., with further reductions of temperature, however, to 4°·74 C., 4°·82 C., and 3°·06 C., the drying tubes got *too little* moisture, the differences being ·47 mm., ·68 mm., and ·81 mm. respectively.

Then the temperature was allowed to rise gradually, and the difference changed sign, having the values ·19 mm. and ·18 mm. at 6°·55 C. and 10°·42 C. respectively. It appeared that the amount of moisture obtained by the chemical method was practically identical with that given by the saturation temperature, when the saturator was not cooled below 8° C; below that, when the temperature was falling, the chemical method gave too small a result; but, as the temperature rose again, too large a result was obtained. The next series of observations, Nos. 31 to 38 (Table IV.), shows this order most clearly. Starting with the temperature of the saturator at 16°·78 C., and gradually cooling it down to 2°·94 C., then allowing it to rise to 6°·47 C., I got the following results:—

TABLE IV.

No.	Temperature of Saturator.	Temperature of Air.	Vapour Pressure by Saturator.	Vapour Pressure by Chemical Method.	Difference in mm.
31	16°·78	20°	14·20	14·29	+·09
32	16·33	18	13·80	13·88	+·08
33	16·33	18	13·80	13·82	+·02
34	11·96	17	10·41	10·47	+·06
35	7·65	17·5	7·78	7·81	+·03
36	4·81	16	6·42	5·64	−·78
37	2·94	18	5·63	4·93	−·70
38	6·47	18·2	7·20	7·50	+·30

It then occurred to me that the effect was probably due to differences of temperature in different parts of the bath.

I had not paid much attention to the uniformity of temperature, as the air was drawn from a point in the interior of the copper cylinder quite close to the bulb of the thermometer, and I considered that the air so withdrawn would be saturated at that temperature, but I had neglected to take sufficient notice of the fact that it was saturated air I was dealing with, and that the effect of the tube which led away the air ought to be considered. It seemed likely that if the water in the bath was not kept thoroughly well stirred, the water, cooled by the melting of the ice, would sink rapidly until the temperature got near 4°, and that then a layer of cold water would be formed on the top of the bath, and cool the top of the cylinder and the tube through which the air came; if this was colder than the saturated air, a part of the moisture would be deposited in the tube; the layer of moisture thus formed would, on the other hand, be at a higher temperature than the rest when the bath gradually got warmer by contact with the air at the top, and the air for the experiment would be slightly warmed and receive an addition to its moisture in passing over this band of moisture. At the end of the series of observations there was no moisture visible on the parts of the tube above the cylinder, but on drawing the tube out of its cork a little way a collar of moisture was distinctly visible where the tube had been cooled by conduction through the cork, and thus my suspicion was confirmed. In consequence of this discovery, considerable attention was devoted to the stirring of the bath, to keep it at a uniform temperature. During an observation I could not hope that the tube would be kept free from deposit, and the only thing to do was to prevent its having any effect on the temperature of saturation. The next six observations show the result of this precaution; the temperature began at 6°·44 C., was reduced to 3°·10 C., and then allowed to rise to 7°·93 C., and therefore included that part of the scale in which the differences were previously most conspicuous.

TABLE V.

No.	Temperature of Saturator.	Temperature of Air.	Vapour Pressure from Saturator.	Vapour Pressure by Chemical Method.	Difference.
39	6°·44	18°·8	7·18	7·25	+·07
40	6·00	19·3	6·97	7·01	+·04
41	3·10	19·9	5·70	5·63	−·07
42	4·76	19·9	6·40	6·43	+·03
43	7·44	21·4	7·69	7·71	+·02
44	7·93	21·1	7·95	8·09	+·14

These six observations gave results agreeing very closely, the mean difference between the tabular saturation pressure and the pressure as deduced from the chemical method being ·06 mm. only. It will be observed that the same degree of accuracy of agreement is given by the observations in Table IV., which are free from the difficulty of the deposit on the leading tube, the mean of the differences for the first five observations in that table being ·056 mm.

As the temperature readings could not be relied upon to an accuracy much beyond 0°·1 C., it seemed unnecessary to endeavour to press the comparison of the saturator and the chemical method further.

§ 11. I concluded that I then knew enough about the methods to be justified in expecting the results of the chemical method to agree with the tabular result obtained from the temperature of the saturator within 0·1 mm., and in regarding the air under those circumstances as being in a known state, and in using it in the investigation of the action of the dew-point instruments. It was, however, necessary to determine whether or not the presence of these instruments affected the air by leakage or otherwise: so that for the succeeding observations I always determined the pressure by the chemical method. First, the Regnault was replaced: the result appeared to be disastrous, as the first two observations gave differences between the saturator and chemical method results of 1·06 and –·37 respectively, but an investigation disclosed a deposit of moisture in the tube above the tap. The rest of the observations taken are all given in the following table, and notes are appended in cases where some disturbing cause was acting.

TABLE VI.

No.	Date.	Hygrometer included.	Temperature, Saturator.	Temperature, Air.	Vapour Pressure, Saturator.	Vapour Pressure, Chemical Method.	Difference in mm.	Remarks.
47	July 19	Regnault	16°·85	19°·14	14·26	14·28	+ ·02	
48	" 19	"	16·89	19·3	14·30	14·27	– ·03	
49	" 21	"	2·94	19·6	5·63	5·90	+ ·27	
50	" 22	"	2·98	20	5·65	5·75	+ ·10	
51	" 22	"	3·68	20	5·93	6·01	+ ·08	
52	" 23	"	7·09	20·5	7·51	7·53	+ ·02	
53	" 24	"	3·22	20	5·75	5·73	– ·02	
54	" 24	"	3·89	20	6·02	6·00	– ·02	
55	" 25	"	7·08	19	7·47	7·57	+ ·10	
56	" 26	"	8·73	17	8·39	8·52	+ ·13	Saturator not completely covered by water.
57	" 28	"	11·74	18·18	10·26	10·29	+ ·03	
58	" 29	"	13·09	19	11·21	11·48	+ ·27	Water not stirred.
59	" 31	"	15·25	21·5	12·88	13·35	+ ·47	The drying tubes were left in connection with the apparatus for some time, and moisture was gained by diffusion.
60	Aug. 1	"	16·49	24	13·94	14·00	+ ·06	
61	" 1	"	16·85	24	14·26	14·72	+ ·46	Hygrometer showed increasing signs of leaking at the joint; was accordingly taken out and replaced.
62	" 2	"	17·62	24	15·00	15·45	+ ·45	
63	" 2	"	18·12	24	15·45	15·84	+ ·39	
64	" 4	"	18·32	22	16·14	16·50	+ ·36	
65	" 5	"	18·45	21	15·86	16·08	+ ·22	
66	" 10	Regnault and Dines.	21·60	27	19·16	19·42	+ ·26	The globe containing the Regnault had been washed and not thoroughly dried.
67	" 11	"	22·02	25	19·65	19·72	+ ·07	
68	" 12	"	22·06	23	19·70	17·04	–1·96	Dines read during the observation. Its tube became covered with moisture that was not taken up subsequently, and therefore lost to the drying tubes. The method of reading was therefore altered (see § 22).
69	" 12	"	22·09	24	19·74	19·16	– ·58	
70	" 16	"	20·27	23·5	17·66	16·90	– ·76	
71	" 19	"	20·63	23	18·05	16·56	–1·49	
72	" 21	"	20·09	23	17·46	17·73	+ ·27	

No.	Date.	Hygrometer included.	Temperature, Saturator.	Temperature, Air.	Vapour Pressure, Saturator.	Vapour Pressure, Chemical Method.	Difference in mm.	Remarks.
73	Aug. 22	Regnault and Dines.	20°·03	24°·5	17·39	17·34	− ·05	
74	„ 27	„	15·75	18	13·30	13·47	+ ·17	
75	„ 28	„	15·72	18	13·27	13·23	− ·04	
76	„ 29	„	6·38	18·5	7·15	6·87	− ·28	84 lbs. of ice were melted to cool the bath, and it is probable that the leading tube remained too cold during the observation.
77	„ 30	„	7·41	17	7·68	7·76	+ ·08	
78	„ 30	„	7·96	18	7·97	7·95	− ·02	
79	Sept. 1	„	11·71	18	10·24	10·33	+ ·09	
80	„ 1	„	12·90	18·5	11·06	11·14	+ ·08	
81	„ 3	„	14·50	18·5	12·27	12·31	+ ·04	
82	„ 5	„	1·09	17	4·94	4·91	− ·03	

It will be seen that there are definite reasons for rejecting the experiments numbered 56, 59, 61–65, 68–72, and of the rest there are five only for which the differences reach 0·1 mm., and the mean difference for the whole number (without regard to sign) of those not rejected amounts to ·077, or again less than ·1 mm.

§ 12. Rejecting from Table VI. then the numbers indicated, and arranging the observations in the order of humidity of the air, we get the following rearrangement of the Tables V. and VI.:—

TABLE VII.

No. of Experiment.	Temperature of Air.	Percentage Humidity.	Difference between Result of Chemical Method and Saturation Pressure.	
			Positive.	Negative.
50	20°	32	+ ·10 mm.	
49	19·6	33	·27 „	
41	19·9	33		— ·07 mm.
53	20	33		·02 „
51	20	34	·08 „	
82	17	34		·03 „
54	20	35		·02 „
42	19·9	37	·03 „	
43	21·4	41	·02 „	
40	19·3	42	·04 „	
52	20·5	42	·02 „	
44	21·4	43	·14 „	
39	18·8	45	·07 „	
76	18·5	45		·28 „
55	19	46	·10 „	
78	18	52		·02 „
77	17	53	·08 „	
60	24	63	·06 „	

No. of Experiment.	Temperature of Air.	Percentage Humidity.	Difference between Result of Chemical Method and Saturation Pressure.	
			Positive.	Negative.
57	18°·5	64	·03 mm.	
79	18	67	·09 „	
80	18·5	75	·08 „	
73	24·5	76		·05 mm.
81	18·5	78	·04 „	
67	25	82	·07 „	
48	19·5	86		·03 „
74	18	87	·17 „	
75	18	87		·04 „
47	19·14	87	·02 „	
28	15	88	·01 „	
27	14·8	91		·05 „
5	13	96		·07 „
13	12·7	100		·18 „

The last four observations are not among those quoted in Tables V. and VI.; they were taken before the behaviour of the saturator and its difficulties were fully understood. They are, however, observations for a very high degree of humidity, and in such cases the peculiar difficulties of the apparatus do not come in; they may therefore, I think, be fairly included in the table of final results.

§ 13. I have now accounted for the whole number of 82 experiments made with the modified apparatus (including those in which dew-point readings were taken) for comparing the saturator and the chemical method at different degrees of humidity, with the exception of three, Nos. 7, 25, and 26. No. 25 gave a difference −·07 when the humidity was 70, and simply confirms the general result; No. 7 gave a difference of +1·73 when the humidity was 87, and No. 26 a difference of −·57 when the humidity was 86; these show a wide divergence, for which I am quite unable to account. There is nothing in my note-book which places those observations on a different footing from the rest; it is true that they were made at a time when I had not fully appreciated the necessity of keeping the bath at a uniform temperature, but the difficulties did not occur with other observations at corresponding humidities. I can only attribute the large differences to clerical errors in entering the weights.

§ 14. The reductions of the observations have been made by formula 3 of page [44], with the aid of the table of page [45]. The value there adopted for the specific gravity of steam referred to air at the same temperature and pressure is ·622. The table of vapour pressures which I used at first was Regnault's; those given in the results are derived from the re-calculation in Landolt and Börnstein's table. The effect of this change is to diminish the saturation pressure by ·02 mm. or ·03 mm. in each case, and has consequently given to the Table VII. a preponderance of + differences which did not show itself when Regnault's numbers were taken. As the table now stands 20 observations give a positive difference and 12 a negative one. If the ·03 mm. be restored 14 observations will have a positive difference, 15 a negative one, while three will give zero difference. Almost precisely the same result would be attained by using the value ·624 for the specific gravity of steam instead of ·622. The one observation on saturated air with the negative difference ·18 mm. in the second series of experiments bears out the results of the previous experiments with the original apparatus (§ 5).

The net result of the whole investigation upon the chemical method would seem to show:—

(1.) That if the specific gravity of saturated aqueous vapour referred to air at the same temperature and pressure be assumed to be ·624, the calculation of the pressure from the weight of moisture absorbed gives a value agreeing to within 0·1 mm. (the mean difference being ·07 mm.) with that derived from the temperature of saturation, provided that the air is superheated after passing through the saturator.

(2.) That there is no reason for assigning the differences in the observations to other than experimental errors.

(3.) That for saturated air, the result of the chemical method is slightly less than the tabulated saturation pressure. This is shown in the first series of experiments and agrees with Regnault's result.

But I think that the later experiments and the observations with the dew-point instrument which follow clearly show that when saturated air is passed along glass tubes at the same or even a slightly higher temperature a deposit of moisture is formed on the glass. The observations of Regnault and Herwig are in favour of this view; and, if that be so, it is clearly impossible to conduct saturated air along glass tubes to the drying tubes; some of the moisture will be deposited on the way. How much moisture will be required to saturate the glass is, I believe, unknown; but if the conducting tubes are maintained at a temperature a degree or more above that of the air when it is being saturated, the deposit will not take place.* Thus, in the observations upon air saturated at a temperature below that of the glass, the air could only travel a very short distance before it came in contact with glass at a temperature higher than its own, and the amount of moisture necessary to saturate this short length of glass would be supplied by the saturated air passed through the apparatus as a preliminary part of the experiment. So that this suggestion seems to me to explain satisfactorily what is otherwise a great difficulty, namely, that the saturation pressure agrees with the tabulated pressure only if the air is heated after being saturated.

To assume that the result of the chemical method should agree exactly with that given by the temperature of the saturator is to assume not only Dalton's law to be true, but also that the expansion of vapour with rise of temperature from the saturation point takes place, according to the law of Gay-Lussac, with a coefficient of expansion the same as that of air. The specific gravity of steam which must be substituted, therefore, in order to obtain identical results by the two methods, is not the actual specific gravity of steam in the unsaturated air experimented on, but what would be the specific gravity if the vapour obeyed Gay-Lussac's law in the manner indicated, or (since the specific gravity is referred to air at the same temperature and pressure) the specific gravity of the saturated vapour. Thus the observations may be employed (as Regnault employed similar observations) to determine the specific gravity of saturated steam at the temperature of the saturator. The observations do not admit of sufficient accuracy to trace the variation of the specific gravity with temperature, but the mean specific gravity for the 32 experiments of Table VII. for temperatures of steam between 1° C. and 21° C., if referred to air at the same temperature and pressure, is ·6245.

Clausius has calculated the specific gravity of saturated steam by thermodynamic reasoning from other known constants of steam (Mechanical Theory of Heat, p. 153). Assuming the value at 0° C. to be ·622, he gives the value, at 50° C., ·631. From his results, therefore, we obtain ·6240 as the mean value between 1° C. and 21° C., a result agreeing very closely with that obtained from my observations.

If, however, the specific gravity of saturated steam be greater than that of unsaturated steam, the vapour cannot obey Gay-Lussac's law in the manner stated, and in consequence the pressure of the vapour of unsaturated steam by the chemical method calculated with the true specific gravity of unsaturated steam (·622) ought to be somewhat greater than that given in the table of pressures of saturated vapour; and the results of Table VII. may accordingly be held to prove that the true pressure of vapour in unsaturated air is greater than the tabulated pressure for the temperature of the saturator by 2/622 of the saturation pressure, that is by an amount varying from ·02 to ·06 mm. for vapour pressures between 4·94 mm. and 19·65 mm. In other words, to obtain the true pressure the proper value to substitute for d in the formula of reduction of the chemical method is ·622, at any rate when the fraction of saturation of the air under experiment is less than ·8, but if the air is saturated the value ·624 must be substituted.

NOTES. (Nov. 11, 1887.)—(1.) In order further to verify the condensation of moisture upon a surface when the air surrounding it is not fully saturated, I have tried to detect the actual difference of weight produced by the deposit. For this purpose I have suspended a glass globe from one arm of a balance, and have counterpoised it, surrounding the globe by a cylinder with a lid formed of two closely fitting pieces of glass, with a small hole left for the suspension wire. Inside the cylinder were placed alternately a vessel of water and a vessel of sulphuric acid. After making all allowances for the density of the air displaced, the experiments show an excess of weight in the moist air corresponding to the condensation of about 1×10^{-5} gramme per square cm. More accurate experiments are, however, in progress.

(2.) In this discussion Dalton's law has been assumed to be strictly accurate. If the differences observed by Regnault (p. [71]) should prove on further investigation to be real differences, the specific gravity of the saturated vapour must be increased to about ·645 for saturated air, and ·643 for non-saturated air.

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* NOTE B., April 23, 1888.—The researches of Warburg and Ihmori ("Wiedemann, Annalen," vol. 27, 1886, p. 481) afford some information about the formation of a deposit. On a specimen of fresh lead glass at about 16° C. exposed to the vapour of water *in vacuo* a deposit of 18×10^{-8} grammes per square centimetre was observed when the vapour pressure inside the vessel corresponded to the temperature 4°·71 C.; the deposit increased to 194×10^{-8} grammes per square centimetre when the vapour pressure was increased so as to correspond to a temperature 0°·87 C. below that of the glass surface. No results are given for lead glass which enable one to form an opinion as to what happens when the difference of temperature is made very small, but for Thuringian glass a sudden increase of 50 per cent. in the deposit is shown for a diminution of the temperature-difference from 0°·27 C. to 0°·17 C. with lead glass, of which even a fresh surface showed comparatively very feeble absorption of vapour, no absorption at all was detected after treatment with boiling water. The apparatus referred to in the text, was, excepting the three-way tap, constructed of lead glass that had been frequently washed with cold water.

§ 15. In conclusion, it may be well to give a specimen of the observations from which the tables are compiled, and some notes of the practical conduct of the work. I take one experiment at random from my note-book: No. 68, August 12.

Initial weight of tubes V., VI.	142·8090 g.;	III., IV.	147·9447 g.	Barometer	30·00.	Temp. Balance Case	24°·70.
Final „ „	143·3856 g.	„	147·9638 g.	„	30·00.	„	25°·00.
Gain - -	·5766 g.		·0191 g.				

Total gain ·5957 gramme.

	Time.	Saturator Temp.	Regnault.	Dines.	Air Temp.
	12·00	22°·39	—	—	23°·80
	12·15	22·38	—	—	23·80
	12·30	22·38	—	—	23·78
	12·45	22·37	—	—	23·73
	1·00	22·37	21·15	21·15	23·80
	1·15	22·38	—	—	23·80
	1·30	22·37	—	—	23·82
	1·45	22·37	—	—	—
	1·53	22·37	—	—	24·00
Duration 1h. 53m.	Means	22·37	21·15	21·15	—
Temp. correction -	-	·31	·27	—	·11
		22·06	20·88	—	—

Final temp. of aspirator 24°·00.

$$e\,(\text{tubes}) = \frac{1{\cdot}0280 \times {\cdot}5957 \times 1{\cdot}00323}{36066{\cdot}5}$$

$$= 19{\cdot}78$$

$$e\,(\text{sat.}) = 19{\cdot}70$$

$$\text{Diff.} \quad {\cdot}08$$

The balance was a short-beam Oertling, and the weights a box of Oertling's, compared with the Laboratory Standard. The weighings were carried to 0·1 mgm. The drying tubes after an experiment were transferred to a desiccator to cool, and then weighed. The barometer and temperature of the balance case were read at each weighing and recorded, so that a correction for weighing in air might be introduced if necessary. (See § 4.) For experiments 1—27 the tubes were filled with sulphuric acid and pumice, and those for 28–82 with phosphoric acid. The alterations in the state of surface of the tube are sufficient to prevent the accuracy of weighing to 0·1 mgm. being entirely trustworthy, but the error is less than 1 mgm. (See p. [41].) This limit gives to the accuracy of the weighing operations in the chemical method a limit of ·6 per cent. for the smallest amount of moisture, viz., ·1737 gramme, and of ·16 per cent. for the largest amount, viz., ·6880 gramme.

The duration of the experiments was generally about 2 hours, varying, in fact, from 1 hr. 10 min. to 2 hrs. 55 min. During that time 36 litres of air passed through the tubes. The amount received by the second tube was very variable. In 29 experiments out of the 82 it was less than 1 mgm.; in one experiment, however, it reached 99 milligrammes. The amount was always added to that received in the first tube for reasons previously stated (§ 6–8).

Before an experiment was commenced dried air was drawn through the whole of the apparatus, except the saturator and aspirator, by the use of an aspirating water-pump for from a quarter to half an hour, to clear the tubes of deposited moisture; for this purpose the third aperture of the three-way tap was employed. After this the plug of the tap was turned, and the air passed through the saturator for a quarter of an hour or more to fill the vessels with air in the state required for the observation. The pump was then cut off, the aspirator connected, and the drying tubes put in their places; the entry tube to the saturator was then closed, and the tightness of the apparatus tested by reading the pressure gauge and observing the cessation of drip from the aspirator. At the close of an observation the moist air was swept out of the globe, &c., by dried air (using the water-pump), unless it was intended to take a second observation immediately; when left over night, the globes, &c., were connected with a calcium chloride bottle.

The temperature readings were by the following thermometers, compared at Kew, as described in § 3:—

Saturator -	Exp. 1-14	Geissler, C. L. C. 21	graduated to	0°·1 C.
„	„ 15-82	Hicks 79,916	„	0°·2 C.
Air -	- -	Hicks 87,400	„	0°·2 C.
Regnault -	-	Hicks 79,915	„	0°·2 C.

Dines.—Its own thermometer by Hicks (not compared).

Aspirator.—An ordinary chemical thermometer compared in the Laboratory, graduated to 0°·5 C.

Other small points of detail, employed to secure as close an accuracy as possible, may be passed over.

Dew-point Hygrometers.

1.—Regnault's Hygrometer.

§ 16. I pass on now to consider the observations made with Regnault's hygrometer upon air in a known state of humidity. The method by which the thimble was exposed to the air to be investigated has already been described (§ 8).

I need now only give particulars of the apparatus adopted for cooling the ether and for reading. The thermometer had a very short cylindrical bulb, and was well covered by the ether in the thimble. The stem of the thermometer was passed through a cork fitting into the glass tube which held the thimble, and through the cork passed also two very narrow copper tubes, one to the bottom of the ether, the other just through the cork. The end of the latter was connected to a Magnus aspirator, which was provided with a tap, so that the rate of passage of the air was under very easy regulation. As the thimble was enclosed in a glass globe, it could be viewed quite closely without any fear of the presence of the observer altering the dew-point.

§ 17. So far as I can gather from published accounts, Regnault's instrument has always been regarded as a standard (see Note C., p. [71]); that is to say, a dew-point determination has been held to give a final verdict as to the pressure of vapour in the atmosphere. Regnault's directions for the use of the instrument are, first of all, to cool the ether so as to obtain a deposit, and note the temperature; then let the temperature rise until the deposit is gone; then cool slowly by tenths of a degree until two-tenths are determined, for the lower of which there is a deposit and for the higher no deposit; the mean gives the dew-point, from which the pressure of vapour in the air is at once obtained by reference to the table of vapour pressures. No calculation is necessary on account of the temperature of the air, because a change of temperature of the air would not cause any appreciable change of pressure, either of dry air or vapour, but only a change of volume. With regard to this method of observation, I may remark that it is not always possible to confine "deposit" and "no deposit" temperatures within the limit of a tenth of a degree. It is comparatively easy to do so when the circulation of air in the neighbourhood of the polished surface is brisk, and I have found from some experiments on dew-point instruments in the strong current produced by a rotary fan that the air current simply improved the facility of reading the instrument, and did not seem to alter the final reading; but this opinion is, I believe, not shared by all experimenters, and I do not press it now, as my observations assumed to some extent the permanence of the condition of the air operated on.* In the experiments I am now dealing with the circulation was slow. The thimble of the hygrometer was contained in a globe of 5 cm. radius, holding therefore about half a litre; through this 36 litres of air were passed on an average in two hours, giving a minimum motion of 3 cm. per minute, assuming, that is, that the motion was uniform over the whole central section of the globe. The motion at the thimble in the middle of the globe was probably considerably greater than this, but at any rate could not be called rapid. Under such circumstances the temperature of the thimble and ether does not rise uniformly, so that one had to keep the ether mixed by an occasional bubble of air, and the practical temperature limits of deposit and no deposit, though sometimes two-tenths, were sometimes four-tenths of a degree centigrade.

§ 18. Let us call the temperature of saturation of the air the theoretical dew-point. Then, in order that the observed dew-point may coincide with the theoretical, the following assumptions seem to be required:—(1.) That as soon as the temperature of the thimble is below the theoretical dew-point, a deposit of moisture is formed. (2.) That the observer can see it. (3.) That there is no deposit when the temperature is above the theoretical dew-point. These three assumptions may be regarded as independent, though their consideration must to some extent overlap. I will take No. 2 first. The possibility of seeing a deposit depends upon circumstances. In the first place the thimble must be highly polished. In one observation, No. 15, when the thimble was tarnished, the saturator being at 16°·96 C., and the chemical method corresponding to a temperature of 17°·2 C., two readings of temperature of earliest *visible* dew deposit were 15° C. and 16°·3 C. respectively, either of them much lower than the theoretical dew-point, and indicating uncertainty in the readings, which did not occur when the thimble was well polished. Secondly, the illumination is of importance. On this point no general direction seems useful; my observations were made indoors, in a room with two windows. I found that I could see the deposit most easily sitting with my back to the windows, and having a reflector or a lamp placed almost behind the thimble, so that the light grazed the side of it, a uniform dark background being immediately behind. Small specks on the polished surface seem to facilitate the reading, the first indication of a deposit being a slight fringe round the specks. Thirdly, different observers do not take the same readings, although practice may do away with the differences.

I was assisted in the observations by one of the students at the Cavendish Laboratory, who had had no previous experience in dew-point readings; at first our readings differed considerably, mine being the higher. The following cases show this:—

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* On this point, see below, pp. [66] and [82].

Saturator.	Dew-point.	Observer.
17°·4	16°·92	S. H.
—	17·17	W. N. S.
13·96	13·53	S. H.
—	13·68	W. N. S.

The differences were still larger in the earlier observations, beginning indeed with a whole degree, but with continued practice they diminished, and after a time became no longer perceptible. As a rule, however, the observation of the dew-point fell to my share. It was necessary, in order to prevent unconscious bias towards a known result, that the observer who read the dew-point temperature should not know what the saturator thermometer was indicating, and in the division of duty I took the dew-point readings; but, as I have said, in the later observations our readings agreed, and if we exchanged the duties there was no recognizable difference.

§ 19. With the utmost anxiety to be quite fair and to observe only what was really to be seen, it was sometimes difficult to form a satisfactory opinion as to whether a deposit was on the thimble or not. Here, for instance, are some notes made on dew-point readings during experiment 6 (air temperature 15° C.):—

Time.	Saturator.	Thermometer Readings.	——
12.40	9°·55	8°·7	Very faint deposit.
1.0	9·50	8·6	" "
—	—	9·7	Deposit gone.
1.15	9·35	8·9	Deposit round specks.
1.25	—	9·0	Fine deposit specks.
1.30	9·50	10·9	Deposit gone.
—	—	10·0	? Deposit.
2.0	9·50	9·45	Dew } Very faint.
2.15	9·50	9·70	Dew
3.0	9·50	7·3	Heavy dew.
Thermometer correction	·50	·27 — ·24	

In this case the observation was exceptionally difficult in consequence of the slower rate of aspiration. According to the assumption, I ought to have seen the deposit when the temperature reading was below 9°·24, and not otherwise. At other times observations seemed to be easier; the following is extracted from my note-book for the next experiment.

Saturator temperature 12°·6–12°·75. Mean 12°·68. Correction 0·42.

Mean theoretical dew-point 12°·26.

Dew-point Observations.	
Dew on.	Dew off.
12°·2	12°·4
12·2	12·5
12·1	12·5
12·4	12·6
12·4	12·8
12·5	12·5

Mean dew-point 12°·42
Correction ·22
Observed dew-point - 12°·20
Difference from theoretical ·06

The impression that is left on the mind by observations with the instrument is a sense of insecurity and want of confidence in the observations, that is sometimes followed by surprise at the concordance of the reading with the theoretical dew-point, and the closeness with which the indication of the dew-point follows any change in the temperature of the saturator, as, for instance, in the example just quoted, where the saturator readings rose from 12°·18 C. to 12°·33 C., the dew-point readings followed from 12°·08 C. to 12°·28 C.

§ 20. The other two assumptions referred to in § 18 may be tested by the accuracy of agreement of the final dew-point readings deduced from the observations with the theoretical dew-point given by the saturator, and the chemical method. The results of the comparison for a number of observations are given in the following table; the numbers of the experiments are the same as those of Table VI.

TABLE VIII.

Number of Experiment.	Temperature of Air.	Percentage Humidity.	Theoretical Dew-point.	Observed Dew-point by Regnault.	Difference.
50	20°	32	2·98°	2·90°	−·08
49	19·6	33	2·94	2·91	−·03
53	20	33	3·22	2·94	−·28
51	20	34	3·68	3·63	−·05
82	17	34	1·17	1·08	−·09
54	20	35	3·89	3·76	−·13
76	18·5	45	6·14	6·10	−·04
55	19	46	7·08	6·85	−·23
78	18	52	7·96	7·88	−·08
77	17	53	7·41	7·33	−·08
60	24	63	16·49	16·35	−·14
57	18·5	64	11·74	11·71	−·03
79	18	67	11·73	11·71	−·02
80	18·5	75	12·90	12·91	+·01
73	24·5	76	20·03	20·19	+·16
81	18·5	78	14·50	14·62	+·12
67	25	82	22·02	22·19	+·17
48	19·5	86	16·89	16·92	+·03
74	18	87	15·75	15·72	−·03
75	18	87	15·72	15·72	·00
47	19·14	87	16·85	16·80	−·05
5	13	96	12·38	? 12·38	? ·00

The theoretical dew-point is taken from the temperature of the saturator, but the observations included in the table are only those for which the result of the chemical method agreed very closely with that of the saturator.

It will be seen that the differences are most frequently negative. They are generally very small, so that it would appear that the assumptions specified on page [59] are generally justified by the experiments. There are two cases in which the dew-point is considerably below the saturator temperature, namely, Nos. 53 and 55. I quote the observations for these two experiments:—

No. 53.

Time.	Saturator.	Dew-point.
	°	°
12.34	3·57	3·10
12.49	3·40	3·05
1.10	3·38	3·05
1.40	3·39	3·10
1.55	3·40	3·05
2.10	3·43	3·30
2.25	3·47	3·35
2.40	3·50	3·30

If in this case we take the last three readings only, we get—

Mean temperature of saturator - 3°·47
Correction - - - - ·23
——— 3°·24
Mean dew-point - - - 3°·32
Correction - - - - ·22
——— 3°·10
———
Difference - - ·14,

so that a nearer approximation would be obtained. It appears that the last three observations correspond to no physical change in the air, but simply refer to some alteration in what was taken as indicating visible dew. This example well illustrates the uncertainty that rests with dew-point determinations.

No. 55.

Time.	Saturator.	Dew-point.
3.5	7°·56	7°·15
3.20	7·59	7·05
3.35	7·21	6·9 7·4 7·15
3.50	7·22	6·8 7·2 7·0
4.10	7·27	6·8 7·2 7·0
4.25	7·31	6·95 7·3 7·12
4.40	7·36	7·1 7·2 7·15
4.55	7·40	7·30
Mean - - -	7·40	7·11
Correction - -	·32	·26
	7·08	6·85

In this case no reason can be readily assigned for the difference. It must be attributed to mere errors of observation, but the rapid and unusual variation of the temperature of the saturator may account for part of the difficulty of obtaining concordant dew-points.

The other noteworthy cases are those in which the dew-point was higher than the saturator temperature Nos. 80, 73, 81, 67, and 48. In the first four of these experiments I was paying special attention to the very faintest indications of the presence of dew. I had come to the conclusion, from observations with Dines' hygrometer conducted in the manner detailed below, that it was possible to get a dew deposit upon a glass surface at a temperature above the theoretical dew-point, and I was endeavouring to ascertain if the same occurred with the Regnault instrument. It would appear that to a certain extent that is the case. I give my observations and notes for Experiment 81:—

No. 81.

	Time.	Saturator.	Dew-point.	Remarks.
	5·30	14°·79	14°·80 { 14·6 15·8	Deposit. Deposit gone.
	5·45	14·80	14·70 { 14·6 14·8	Deposit. Deposit gone.
	6.0	14·80	14·72	
	6.15	14·80	14·80	
	6.27	—	—	A dew-point reading taken, cooling very slowly. Dew seen at 15°·0. Dew-point 15°·02. Observation repeated: dew at 14°·9.
	6.30	14·80	14·9	Dew at 14°·9, very definite indication.
	6.45	14·81	14·85	Dew at 14°·85 „ „
Thermometer correction		·30	·18	

The dew-point is put down as the temperature of appearance of dew in the last two readings, as the deposit was extremely transient. It would appear from this that dew may, with very great care, be seen at a temperature from 0°·16 C. to 0°·32 C. above the dew-point. The other observations are merely ordinary dew-point determinations, and may be affected by too high a reading being set down for the temperature of disappearance; but I had no doubt in the case quoted above. I find also the following note in my note-book for Experiment 82, when the saturator read 1°·18 C. (corrected): "There is a change in appearance of the " silver at 2°·1 (uncorrected), and the dew deposit is very slight even when the temperature is considerably " below the dew-point. The dew-point as 'naturally' determined is given in the table. The plan of " reading deposit both on and off is quite useless, as the dew often disappears when the thermometer shows " a temperature below that at which dew was previously deposited." If the change in appearance at 2°·1 indicated a deposit, allowing for thermometer corrections, the deposit would have been seen at 1°·88, when the theoretical dew-point was 1°·18, in other words at a temperature of 0°·7 above the saturation temperature.

§ 21. It would appear, therefore, that the third assumption of p. [59], viz., that there is no deposit unless the temperature of the thimble is below the theoretical dew-point, is not strictly true if the very first indications of a dew deposit are taken into account.

With the exceptions thus mentioned, the theoretical and observed dew-points are in very close agreement. It may be said that at first an observer would probably obtain too low a reading with Regnault's instrument, and that with a fair amount of practice his observed dew-points would probably agree on the average with the temperature of saturation, although there might be exceptional observations with somewhat widely diverging readings, depending possibly upon the illumination of the thimble. Finally, if very closely observed, the dew-point would be some tenths of a degree too high, in consequence of a slight deposit formed above the true dew-point.

2.—DINES' HYGROMETER.

§ 22. The method of introducing the instrument into the air to be investigated has been already described, § 8. The presence of the instrument caused at first considerable interference with the comparison of the saturator and chemical method. In order to cool the glass surface upon which the deposit is formed, water, cooled by dissolving ice in it, is made to pass along a metal tube T (Fig. 4, p. [50]), which runs close to the stem of the thermometer *t*, and ends in the metallic box B, into which the thermometer dips. The small cistern which holds the cooled water is in the ordinary course screwed on to the leading tube at A. I found, however, that the neighbourhood of this cold reservoir caused a deposit of moisture in the tubes of the apparatus near it, and in consequence spoiled Experiment 71, and the previous Experiments 68, 69, and 70 had been rendered useless by the deposit formed in the long metal tube, which must of course be cooled below the dew-point and cause condensation before the glass surface can be cooled. So that the observations of dew-point with Dines' hygrometer reduced from these experiments are not of much value. In order to avoid these defects the flow of water in the Dines was reversed, so that it had only to pass through a very short length of tube before reaching the box, and the cistern was separated from the rest of the apparatus by a considerable length of india-rubber tubing. Further, the observations were only taken with Dines' instrument at the close of an experiment, after the drying tubes had been detached from the aspirator. The apparatus was then connected with an aspirating air pump, and air drawn through the saturator and the vessel containing the hygrometer.

§ 23. The observation of a dew deposit upon the surface of the blackened glass is a very easy matter and much more satisfactory than with the Regnault thimble. The arrangement that I have found to give the easiest observation is to attach a piece of black paper to the middle of the window of the room, and look at the glass surface from such a direction that it reflects only the black paper when there is no dew on the surface. Under these circumstances a deposit shews itself with surprising facility. The observations taken with Dines' instrument were as follows:

After Experiment 73. Saturator reading 20°·05
Dines, 68° F. = 20°·00
−0°·05 diff.

" 77. Saturator reading, 7°·49.
Dines first showed dew at 10°·6 but no more at 8°·3; on a second trial dew at 7°·8.

" 78. Saturator reading, 8°·00.
Dines:—Water run through slowly, dew appeared at the first edge (nearest to the entering water) at 9°·6; water stopped:—temperature gradually sank to 9°·00, and dew appeared at the other end, the first deposit vanishing. The second deposit was visible only in the best light and vanished without any measurable alteration of temperature. Observation repeated:—dew found at first edge at 9°·72, but no dew formed on other parts, although the temperature was reduced to 9°·06. The temperature was run down to 7°·78 before anything like a wide deposit of dew was formed. An estimate of 8°·3 was made as the dew-point, and confirmed by repetition of the observation.

" 79. Saturator reading, 11°·61.
Dines:—Dew at further end at 15°·61. Thermometer went down without any more cold water to 13°·6, and the dew extended partly over the glass. Dew at both ends at 13°·06; vanished from the one end without alteration of temperature; disappeared altogether although the thermometer fell to 12°·67.

" 80. Saturator reading, 13°·83.
Dines:—Observation taken without air being drawn through, *i.e.*, without circulation; a deposit was formed at the near end only at 9°·28.

" 81. Saturator reading, 14°·51.
Dines:—Temperature reduced to 14°·00 without drawing any air through; on starting the air, dew was deposited at first on the edge nearest to the air inlet, and it gradually extended over part of the glass surface without alteration of temperature.

" 82. Saturator reading, 0°·80.
Dines dew-point, 1°·22.
With ice only the temperature of Dines could not be reduced below 1°·22, at which temperature the dew was just visible. Calcium chloride and sodium chloride were then added to the ice, and the following observations made. The faintest visible deposit was at 1°·2. Cooling down to 0°·56 increased the deposit, but not very greatly. This was repeated many times, and in one experiment the thermometer was taken down to 0°, but the deposit was not then very large, though quite distinct.

On September 4, the day after Experiment 81, observations were made with Dines' instrument, but no observation with the chemical method was made.

The object of the experiment was to watch for the deposits of the dew when the temperature of Dines was maintained as nearly as possible at constant temperatures.

The following are the observations:—

EXPERIMENT 83.

Time.	Saturator.	Air Temperature.	Dines.
3h. 28m.	15°·09	16°·04	
3.30	15·01	—	Thermometer run slowly down; dew first showed at the near end at 15·00, and gradually extended all over the further side while the thermometer fell—ultimately to 12·2; the deposit continued to increase, but only on the same portion of the surface. Dry air passed through and deposit removed.
3.45	15·00	—	Dry air stopped and damp air sent through. Dines reading 12·89. Deposit formed on a portion only of the face. Deposit removed by dry air.
3.52	14·98	—	Dines, 13·89; damp air turned on and gave a deposit after some time.
3.55	—	—	Dines, 14·44; damp air put on; dew visible in 1m. 45s. Dry air put on; dew gone in 11s.
4.0	15·00	—	Dines, 15·00. First sign of dew visible at 1m. 11s. after starting air. Dines was then standing at 15·22; it rose to 15·44, the dew still remaining.
4.6	15·00	—	Dines, 15·56; damp air sent through, a very faint deposit of dew appeared, which did not disappear until the thermometer had reached 15·72.
4.20	15·00	—	Dines cooled again slowly. First indication of dew at 15·7, very faint; water stopped and thermometer fell to 15·4, and dew slightly increased. Still on at 15·6, rather fainter at 16·1.
4.35	15·01	—	The deposit did not completely disappear until the thermometer reached 16·94.
4.46	—	—	The water was then run through still more slowly. A deposit of dew was visible when the thermometer reading was 16·2, and the water was then kept just flowing. The thermometer reading never went below 16·1, but the dew deposit was quite distinct.
5.7	15·02	—	Damp air turned on, and last observation repeated. Started at 16·7; dew began to form almost immediately, and the flow was stopped, the thermometer fell to 15·8, showing increase of dew without further supply. To verify that there was a real deposit, and not an incidental reflexion, the tap was turned and dry air sent through, the spot on the glass being carefully watched. The cloud distinctly cleared off.

§ 24. It will be seen from these experiments (Nos. 78 and 79) that the temperature of the water in the interior of the metal box, of which the glass surface forms the lid, is not necessarily uniform. If the flow is very slow a narrow current is established through the box and a deposit forms along it, the other part being left bare (Experiment 81). The facility of reading is much improved by a circulation of the air (Experiment 80). Certain of the experiments show that a dew deposit is formed at a temperature above the theoretical dew-point. Thus in Experiment 82 the deposit is obtained at 1°·22, the theoretical dew-point being 0°·80; and in Experiment 83 a deposit was obtained at 16°·22, the theoretical dew-point being 15°·02. These readings were obtained many times successively, so that they cannot be assigned to want of uniformity in the temperature. They show that a visible deposit is obtainable upon a glass surface when the air is not saturated, and the difference is larger than in the case of the Regnault hygrometer, amounting to a whole degree in Experiment 83.

It, therefore, seems that the result obtained from observations with Dines' hygrometer is likely to give a very easy determination of the dew-point, that is within small limits of error; but, that if it is observed with the closest attention, the result will be considerably too high in consequence of the premature formation of a dew deposit, and it may be erroneous in consequence of the variations in temperature of the different parts of the box containing the thermometer. This latter effect may be almost entirely avoided by using, for forming the deposit, water which is itself of a uniform temperature and very slightly below the dew-point, so that a large quantity may be required to flow for a small change of temperature, or by the method suggested by Professor Chrystal, and in use by some of the Scottish observers, as by Mr. H. N. Dickson (see Proc. R.S.E., xiii., pp. 199 and 951). But the instrument can hardly be regarded as a standard one.

The deposit upon the glass surface above the dew-point is, I think, well established; it was suspected by Regnault (see p. [71]), and appears to be less obvious in the case of silver than of glass. The difference may, however, be due to the greater difficulty of observing it.

3.—ALLUARD'S INSTRUMENT.

§ 25. A description of this modification of Regnault's instrument is given in Note C. (p. [82].) The difference between the two lies entirely in the facility of reading. Alluard encloses his thermometer in a brass box with gilt and polished sides, and surrounds one side with a brass plate so cut that the side of the box is surrounded by a surface of brass in the same plane with it. It is easier and less uncertain in reading than Regnault's instrument. The best way of illuminating it is similar to that suggested for Dines' hygrometer, namely, to set up a small patch of black paper in the window and arrange the reflecting surface of the hygrometer so that the eye sees the reflection of the black paper. A very faint deposit of dew is at once visible. I have not been able to arrange the instrument so that I could observe its behaviour in air of a known state. The instrument is too bulky for me to do that without apparatus on a much larger scale than mine. I cannot, however, think that such a course is necessary. The observations cannot differ from those with Regnault's instrument, except in regard to the facility of seeing deposits. For that reason it is more suitable for use as a standard instrument, as the feeling of uncertainty, that is very strong while working with Regnault's, is much less with Alluard's.*

4.—BOGEN'S INSTRUMENT.

§ 26. I need spend but few words over this instrument. It is a dew-point instrument in which the cooling is produced by solution of ammonium nitrate contained in a silvered glass vessel. The water is squeezed into the glass vessel by means of a flexible india-rubber ball, and the temperature of the deposition is read in the usual way. It affords a fairly good lecture experiment, but continued observations are quite impracticable as the apparatus has to be washed out as soon as one observation is taken, and the delay and trouble is too great. There is, besides, no possibility of graduating the fall of temperature. I have made a few observations with it, but it is not worth while to recall them.

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* On turning back to some results that I obtained in 1883, I find considerable differences in the readings of different dew-point instruments. I was at that time comparing all the different instruments that I had, viz., Alluard, Regnault, Dines, hair-hygrometer, and a large number of wet and dry bulbs, whose indications were reduced by two sets of tables, viz., Jelinek's and Glaisher's. They were honest attempts to obtain a comparison of the indications of different instruments, but the results were such that they showed that a very systematic investigation was required before one could hope to obtain concordant observations. I quote a table of results here. I made the assumption that by driving the air of the room over all the instruments by means of a rotary fan I should obtain all the instruments exposed to air in the same state. I fear that could not have been correct. I used the chemical method as a check, but I have since that time seen means of improvement, and I only offer the table as a specimen of the difficulties of a hygrometric observer.

TABLE of VAPOUR PRESSURE in ROOM, as deduced from OBSERVATIONS with various INSTRUMENTS, 1883.

Date.	Chemical Method.	Alluard.	Regnault.	Dines.	Hair.	Wet and Dry by Glaisher.	Wet and Dry by Jelinek.
April 10	4·81	4·91	7·34	5·81	—	6·24	5·48
„ 11	4·87	5·49	5·85	—	5·25	7·39 (?)	7·04 (?)
„ 12	5·4	5·69	5·53	6·9	5·35	6·98	6·49
„ 13	5·74	—	5·66	7·54	5·44	6·93	6·38
May 2	5·1	5·10	5·40	5·82	5·14	6·57	5·96
„ 3	6·5	5·53	6·01	6·24	5·68	6·45	5·81
„ 5	6·1	5·89	6·23	6·45	5·31	6·40	5·85
„ 8	7·65	7·57	7·88	8·35	7·27	8·23	8·14

I had previously attempted to compare all the dew-point instruments together in the manner described in my preliminary report of May 10, 1881, but after a few observations I came to the conclusion that any such attempt was worthless unless a circulation of air was provided, observations of different hygrometers in a closed vessel not giving comparable results.

NOTE C.

SUMMARY of the RESULTS of WORK on HYGROMETRIC INSTRUMENTS and METHODS since the time of PROF. J. F. DANIELL.

THE subject of Hygrometry was considered in an essay by Daniell, a third edition of which was published in 1845, Daniell, 1845. after the author's death; it discusses the method of hygrometric observation founded on the deposition of dew upon an artificially cooled surface, and describes the method of using and the advantages of the dew-point hygrometer invented by Daniell,* in 1820. The following paragraphs may be quoted as bearing on the subject which I have now in hand:—

"It was also an important object to ascertain whether any hygrometric property of the glass, or difference between it and the metal in attraction of moisture, would have any appreciable effect upon the condensing power.

"Long experience has, however, convinced me that the metallic hygrometer possesses no real superiority over the glass one. The visibility of the deposition in the latter is rendered perfect by making the condensing ball of black glass, and viewing it by reflected light in the manner of a mirror; and I never could perceive any difference in the sensibility of the two instruments."

The Essay also discusses tables of pressure of aqueous vapour, &c., which have been entirely modified by subsequent and more accurate experimental data. Hygrometers founded upon the variation of organic substances are considered, and evidence to show the superiority of the dew-point methods is adduced. The chief reasons against organic hygrometers, as de Saussure's and De Luc's, are quoted from de Saussure's Essay. Setting aside the difficulty of preparation of the hairs, it would appear that de Saussure did not expect two hair hygrometers to give identical readings, even when similarly prepared and mounted, and the following instance of a case in which identical readings would not be obtained was taken by Daniell from de Saussure. If two otherwise identical hygrometers are both exposed for a long time to very dry air, say at 40° of the hair hygrometer scale, and then one of them is exposed to a humidity of 30° while the other is in an atmosphere of 50°, when the two are replaced in the same atmosphere of 40° humidity, neither will return to the 40° indication; one will read about 37° or 38°, and the other 42° or 43°.

Daniell had used De Luc's hygrometer, and considered it as unsatisfactory as de Saussure's.

He discusses also the wet and dry-bulb method (which was introduced by Dr. Hutton and modified by Sir John Leslie) in the form given to it by Dr. Mason. We need not trouble about previous modifications, as Mason's form is now practically adopted.

At this time Apjohn's formula $f'' = f' - \frac{d}{88} \times \frac{p}{30}$ for calculating the pressure of vapour from the wet and dry-bulb indications was known. Daniell calls attention to the following disadvantages attending their use:—

(1.) The smallness of the scale of the instrument, so that the probable errors of observation bear a very high proportion to the required result, particularly about the freezing point.

(2.) The liability of the indication to be affected by causes other than the humidity of the air and its temperature. The suggestion of Peltier, that it may be affected by the electrical state of the atmosphere, is referred to as a possible explanation of the cases of the temperature of the wet bulb being found above that of the dry "which occurs in all long series of observations." See pages [75] and [80].

(3.) The uncertainty in the results computed from the observations; instances are given to show that the results deduced by Apjohn's formula are different from those obtained from the Greenwich table of factors, derived from experimental comparison of the wet-and-dry-bulb readings with direct observations of the dew-point.

There is another discussion, in English, of the various questions relating to hygrometric measurements, occupying 1842, Ency. Brit. 22 pages of the seventh edition of the "Encyclopædia Britannica," and published in 1842, from which we extract the following information about *Balance Hygrometers*:—

"Hygrometers have frequently been formed by suspending from one arm of a balance some substance which strongly attracts moisture from the atmosphere, and nicely counterpoising it by a weight on the other arm. The changes in the humidity of the air are then meant to be indicated by the changes in the position of the beam, arising from the gain or loss of weight in the suspended body. A great variety of substances have been used for this purpose, such as sponge, caustic potash, the deliquescent salts, sulphuric acid, &c. These, like the former instruments, are all too late in their indications, though some of them might scarcely be liable to lose their sensibility were it not that they soon become useless from the accumulation of dust, soot, &c., especially if in or near a large city."

De Saussure's hair and De Luc's whalebone hygrometers are carefully described, and a comparison of their scales is given, showing very considerable divergence, and indicating very peculiar behaviour of the hair hygrometer, as though it had a maximum near the saturation point. I give half the table of comparison to make the divergence clear. This is De Luc's comparison, and was repudiated by de Saussure, because De Luc saturated the hygrometer by actual contact with water.

De Luc.	de Saussure.
55	88·8
60	91·6
65	93·8
70	95·6
75	97·2
80	98
85	100
90	100
95	99·3
100	98·3

We may perhaps disregard Wilson's hygrometer, which is a mercury thermometer, with a rat's bladder bulb. A good deal of the article is taken up with a discussion of some of the thermodynamic properties of air, not much to the point.

We have next a discussion of dew-point methods, and a description of Daniell's hygrometer, and an exposition of its defects, as well as those of the various suggestions made as improvements on Daniell's, of which there are many.

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* Quarterly Journal of Science, 1820.

A table of results of comparisons of Daniell's and various instruments of this kind is given, and the mean errors (28 experiments) from the results obtained by Leroy's method (cooled water in an open vessel) are given as follows:—

Adie's - - - - -	− 0°·1
Daniell's - - - - -	+ 2°·9
Spherical bulb - - - -	− 4°·78
Long bulb - - - - -	− 6°·6

The author of the article then turns his attention to the wet and dry-bulb method, which he says has been sadly neglected for 30 years. The following extract will show the application of a formula of reduction to very wide variations in the conditions of observation; the result is very fairly satisfactory:—

" The results of experiments determining the dew-point for a considerable number of indications of the wet and dry thermometers, and under various pressures, though principally at pretty high temperatures, are given in a Calcutta journal, 'Gleanings in Science,' Nos. II. and III., 1829, and in the Edinburgh Phil. Journ. for October 1833, from which we have obtained the following table. The sixth column is derived from the formula—

$$f_{t'} - \frac{(f_t + \cdot 66372)\,(t - t')}{175\cdot 438 f_t} = f_{t''},$$

where t is the Fahrenheit temperature of the air, t' that of the moist bulb, and t'' the dew-point; and f_t, $f_{t'}$, $f_{t''}$ are the forces of aqueous vapour in a state of saturation at these temperatures respectively.

Barometer.	Temperature of the Air.	Temperature of Moist Bulb.	Difference or Depression.	Observed Dew-point.	Computed Dew-point.	Difference.	Remarks.
29·75	67°·2	52°·0	15°·2	35°·7	35°·7	0°	Dr. Anderson's experiments.
30·025	56·4	49·5	6·9	39·5	40·7	+1·2	
29·35	65·0	51·5	13·5	35·45	36·6	+1·1	
29·787	82·0	76·8	5·2	74·0	75·0	+1·0	Observations made in India, at the level of the sea, by means of Leslie's and Daniell's hygrometers.
29·83	81·0	72·1	8·9	68·0	68·6	+0·6	
29·78	81·5	70·9	10·6	66·5	66·5	0	
29·8	74·75	67·3	7·45	63·0	63·6	+0·6	
28·739	91·5	69·2	21·3	60·5	60·1	−0·4	Do. on hills in the south of India.
28·739	91·5	70·7	20·8	62·5	62·7	+0·2	
28·807	87·5	71·48	16·02	64·0	65·4	+1·4	
24·342	70·25	60·0	10·25	54·0	53·6	−0·4	
22·945	61·75	54·37	7·38	48·0	47·98	−0·02	
22·921	63·0	53·46	9·54	46·0	45·3	−0·7	
22·917	61·75	46·09	15·66	26·5	25·0	−1·5	
22·909	57·75	47·75	10·0	36·0	35·7	−0·3	

" The dew-points in the sixth column do not differ very materially from observation; but the temperatures from which they were computed had first to be corrected for the barometric pressure being different from 30 inches. The precise rule for estimating such a correction is as yet unknown; but it appears that, for the same temperature of the moist bulb, the difference between it and the dry thermometer, when the pressure amounts to 30 inches, is to their difference under any other pressure, B, nearly in the inverse ratio of 57 to 27 + B. On this supposition, $t - t'$, the observed depression in the fourth column, before being used in the formula, has been multiplied by $\frac{27 + \text{B}}{57}$, and the difference between the product and $t - t'$ has likewise been applied, with its sign changed, as a correction to t, the temperature of the air."

Passing by a discussion of the theory of the instrument, which may require modification in the light of subsequent progress in the theory of heat, and a graphic method of reducing observations proposed by Mr. Meikle, the other points of interest in the article are a brief account of de la Rive's suggestion (since developed by Mr. Wildman Whitehouse) to apply the rise of temperature produced in a thermometer moistened with sulphuric acid, to determine the hygrometric state of the air.

" While the sulphuric-acid hygrometer displays considerable ingenuity, the other instrument, the wet bulb, is on several accounts so decidedly preferable that the invention of M. de la Rive is not likely ever to come into general use. Water can be more readily obtained everywhere, and is much more safe and portable than sulphuric acid. Besides, owing to sulphuric acid freezing at an uncertain or variable temperature, depending on its strength, such an instrument would be apt to give doubtful results at low temperatures. For, whatever be the strength of the acid at first, it will continue to decrease in an uncertain manner on the bulb by gradually absorbing moisture. However, the heat derived from the condensation of the vapour will sometimes be sufficient to keep the acid in a liquid state at a temperature which would freeze it in a close vessel; and whenever it happens that sulphuric acid remains liquid on the bulb of one thermometer, while water is frozen on that of another, a comparison of the two instruments might throw some light on the influence of frost on the temperature of the latter. We presume, therefore, that the most important use likely to be derived from this hygrometer of M. de la Rive would be to assist in perfecting the theory of the moist-bulb hygrometer; and possibly some other absorbent substances might answer even better for this purpose than sulphuric acid does."

Prof. J. D. Forbes, B.A. Report, 1832.

The B. A. Report of 1832 includes a report on meteorology by Prof. J. D. Forbes, the chief points of which are recapitulated in the Encyclopædia article already cited; it is, however, mentioned that de Saussure's "views of hygrometry were, in some respects, so very imperfect that he was not aware of the fact that the coolness produced by the "evaporation of water from porous bodies was independent of the rate at which the moisture was carried off by "currents of air—a want of knowledge which gave him much trouble."* There is in addition a passing reference to the labours of Gay-Lussac and Melloni upon the scale of de Saussure's hygrometer. These, I think, it is needless to discuss, as the subject has since been taken up by Regnault.

B.A. Report, 1840.

A supplementary report of the same authority appears in the B. A. Report of 1840, in which the advantages of the wet-and-dry-bulb method, as compared with the dew-point method, are pointed out. A good deal of attention had been paid to the former method about that time, and from the results of the work Forbes considered that "we may "now consider the moist bulb problem as practically solved." The solution appears to be as follows:—

Theoretical considerations lead to the assumption of a formula:

$$e'' = e' - m\,(t - t')\,\frac{b - e'}{\mathrm{B.}}$$

Where e'' represents the actual pressure of vapour in the air.

e' the saturation pressure at the temperature t'.

t and t' the readings of the dry and wet bulbs respectively.

b the height of the barometer.

B a standard barometric height.

m is a constant to be determined, either by calculation or by auxiliary hygrometric determinations.

"This formula, employed by August and Bohnenberger, coincides essentially with that of Ivory (Phil. Mag., vol. lx. 1822, p. 81), for who first gave a proper theory of the moistened bulb hygrometer. His value for m is not far from the truth, being $\frac{1}{40}$ cent. degrees or $\frac{1}{72}$ for Fahrenheit."†

Apjohn tested the value of m in a variety of circumstances by his own experiments and by those of others. Assuming de la Roche and Bérard's value of the specific heat of air, he finds m for English inches and for Fahrenheit's degree to be $\frac{1}{87} = \cdot 01149$: *à posteriori* he has determined it—

(1.) From experiments on the dew-point - - - - - - ·01151
(2.) " " refrigeration in dry air - - - - - ·01150
(3.) " " " air once saturated, then warmed - - ·01140

Bohnenbérger's value of the constant m reduced to inches and Fahrenheit degrees is $m = \cdot 0114$, which is practically identical with Apjohn's values.

Kämtz‡ employs a formula which differs only slightly from that given above, and from observations on the Faulhorn obtains a value ·0118 for m when reduced to the same units.

Kupffer§ gives the value $m = \cdot 01135$.

Prinsep‖ has furnished us with a large number of valuable test experiments in a warm climate. They are already referred to in the table on p. [68]. The report continues: "When we find that Mr. Prinsep once more coincides with "Dr. Apjohn's numbers, only hesitating whether to prefer $\frac{1}{84}$ to $\frac{1}{87}$ for the value of m, we are prepared to admit that "this problem is *practically* speaking, *completely* resolved, and this being the case, it is scarcely worth while to "disentangle the various imperfect steps by which so happy a consummation has been attained, and the hygrometer "rendered as commodious and as accurate as the common thermometer."

These citations and references will perhaps be sufficient to show what were accepted in England as the well-established facts in hygrometry before Regnault introduced a degree of accuracy into thermal experimental measurement that necessitated a revision of the experimental work done in all branches of science connected therewith. It would, however, appear that there was some valuable work done on the Continent, which, if known in England, had not found its way into the summaries of the subject that I have been able to consult.

Belli, 1831.

There is a very good account of the state of hygrometrical science in the second volume of the "Corso "elementare di Fisica sperimentale," by Giuseppe Belli, published in 1831. The various rough methods (including de la Rive's sulphuric acid arrangement) are described and their weak points are thoughtfully laid bare. Daniell's hygrometer is examined, and the reasons which may make its indications untrustworthy are set forth. Döbereiner's modification¶ is cited as one of many given in Gehler's dictionary. The author then goes on to describe a method of using a dew-depositing arrangement which consists in reading the *temperature of the boundary* of a dew deposit upon a surface whose temperature varies continously, instead of reading the temperature of a surface assumed to be at a uniform temperature at the *instant* at which a deposit occurs.

It is unnecessary to give a lengthy description; it will be sufficient to say that the lower end of a vertical column of mercury in an iron cylindrical tube is maintained by ice or by a freezing mixture at a very low temperature; after some time the temperature of the column becomes steady, and gradually increasing in the vertical direction. Dew is deposited up to certain height, and the temperature at that height is read by a thermometer with a small bulb sunk in the mercury to the required level. The height of the thermometer bulb can be adjusted, and its position defined by two index points which are on the same level as the bulb. The precautions necessary for accuracy are described in due course. This instrument was used by Belli as a standard hygrometer.

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* B.A. Report, 1832, p. 239.

† B.A. Report, 1840, p. 98 (note).

‡ Pogg. Ann., xxx. 1836, p. 43.

§ Bulletin de l'Académie des Sciences de St. Pétersbourg, vi., No. 22.

‖ Journal of Asiatic Society of Bengal, 1836.

¶ Gilbert's Annalen, lxx. 1822, p. 136.

After this discussion, he passes on to his evaporation hygrometer, and the wet-and-dry bulb. His experiments showed (1) a depression of the wet-bulb reading of about 0°·7 R. as corresponding to a relative motion of the air of three metres per second; (2) in still air wet-bulb thermometers with large bulbs take a longer time to arrive at their final temperature than those with small bulbs, and the final temperature is higher in the former than in the latter case. I was interested to notice that he included in his comparison observations a brass ball 80 mm. in diameter, containing the bulb of a thermometer, as I had made the same experiment with the same object before I knew of Belli's work. I quote his results. He concludes from them that, provided there is a sufficiently good air current, the reading is independent of the size of the bulb.

TABLE I.—Air still.

—	Temperature of Room.	A. 8 mm. diam.	B. Cylindrical. 44 mm. and 7 mm.	C. 16 mm. diam.	D. Brass Ball.
h. m. 3 45	° 10·9 R.	° 7·75	° 8·0	° 8·20	° 9·2
3 55	10·9	7·75	8·0	8·15	8·9
4 5	10·75	7·75	8·0	8·1	8·6
4 15	10·7	7·75	8·0	8·05	8·6
4 25	10·67	7·75	8·0	8·05	8·6

TABLE II.—Air agitated by a Cardboard Fan.

Time.	Temperature of Room.	A.	B.	C.	D.
Air still	° 10·67 R.	° 7·75	° 8·0	° 8·05	° 8·6
After 4 m. agitation	10·85	7·5	7·5	7·7	7·9
„ 6 m. more -	10·9	7·48	7·5	7·5	7·65
„ some more -	11·0	7·48	7·6	7·6	7·65
Freshly bathed, and the air then agitated for 6 m.					
4h. 55m.	11·05	7·6	7·7	7·7	8·2
5h. 0m.	11·1	7·5	7·7	—	7·9
5h. 5m.	—	7·55	7·65	7·7	7·7
5h. 10m.	11·1	7·6	7·7	7·7	7·8
Left standing without agitation of air for 10 m.					
—	10·9	8·0	8·1	8·1	8·5

Some experiments to determine the effect of radiation upon a wet bulb are then detailed. A wet-bulb thermometer was observed alternately in the sun's rays and in shadow, in two positions in the same room a short distance apart. The air surrounding the bulb was kept in motion for each of the positions; the bulb in the sun gave a mean temperature of 20°·66 C., and in the shade 20°·14 C., the temperature of the air being 25°·25 C. From this observation a calculation is made that the effect of radiation upon a wet bulb under ordinary circumstances would not exceed 0°·2 C.

Belli therefore considered that a satisfactory observation with a wet bulb that could be used as a basis of calculation could be obtained, provided that the bulb is small, not greater than 7 mm. in diameter, and that the air in its neighbourhood is kept in a state of brisk agitation.

These conditions being satisfied, sets of tables might be formed, each table corresponding to a particular pressure, and showing, for that pressure, the pressure of aqueous vapour for a given temperature of the air, and a given difference between the wet and dry bulb.

Belli then proceeds to calculate a formula for the psychrometer, which comes out for the pressure 760 mm. :—

$$e = E' - \cdot 592\ (T - T').$$

This agrees remarkably well with August's formula, $e = E' - 0\cdot0007832\ (T - T')\ P$, for the same value of the air pressure.*

Some comparisons of results obtained by this formula are given. They are not very consistent as they stand, but the tables used in their reduction have been considerably modified since that time, so that the observations require to be re-calculated before any opinion can be formed about them.

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* See below, p. [72].

An apparently complete enumeration of hygrometrical methods is given in the article "Hygrometer," in Gehler's Wörterbuch (1829), already alluded to. Upwards of 50 different instruments and modifications are described. A section is devoted to the theory of the different methods, which it is needless to reproduce. The author prefers the psychrometer to Daniell's hygrometer, and is of opinion that it is impossible to construct a truly scientific instrument founded on the alteration of dimensions of animal or vegetable substances.

Regnault, 1845.

I pass on now to the consideration of the work bearing upon hygrometric measurements by Regnault. That which was directly intended for the elucidation of the subject is contained in two papers published in the Annales de Chimie, and entitled "Études sur l'hygrometrie."*

Fundamental data.

The first part of the first memoir is devoted to the discussion of the fundamental data of all hygrometric calculation, viz.:—

(1.) The saturation pressure of aqueous vapour in the air at different atmospheric temperatures.
(2.) The specific gravity of aqueous vapour in saturated air referred to dry air, at the same temperature and pressure.
(3.) The specific gravity of aqueous vapour referred to air, at the same temperature and pressure, when the fraction of saturation is less than unity.

Dalton's Law.

The discussion of the first question amounts to an investigation of the truth of Dalton's hypothesis with regard to saturated air, namely, that the saturation pressure of water vapour in air is the same as it would be at the same temperature *in vacuo*; so that in any hygrometric calculation the saturation pressure of vapour may be taken from the table of pressures of water vapour *in vacuo* for different temperatures.

For the experiments we are now referring to, Regnault used a slightly modified arrangement of his apparatus for determining the vacuum pressures, and obtained the saturation pressure in air and nitrogen gas. The pressure in air was observed for 34 temperatures lying between the limits 0° C. and 38° C. The results obtained show a pressure in air less than that given by the table for vacuum, by amounts varying between ·10 mm. and ·74 mm., the mean of the differences between the two tables of observations being ·44 mm.

The results obtained with nitrogen gas are very similar, the mean differences for the first of two sets of observations being ·56 mm. The differences, though very irregular in amount, are considerable, and are always in the same direction, and might, therefore, be held to show that Dalton's law is only approximately true. Regnault, however, suggests that they may be due to some constant error which he could not discover, and later, in the same memoir, and in a subsequent paper on the pressures of ether and other vapours (Mémoires de l'Institut, t. xxvi.), he adduces reasons in favour of that suggestion; attributing, in fact, the diminished pressure of vapour to the molecular action of the glass side of the vessel upon the saturated vapour contained in the air, producing a condensation upon the glass, the slowness of diffusion preventing the pressure reaching its maximum value by consequent evaporation.†

Specific gravity of water vapour.

The second and third questions may likewise be disposed of theoretically, or, perhaps I should say, hypothetically, provided aqueous vapour may be regarded as behaving like a perfect gas when its pressure and temperature are made to vary.

In that case the specific gravity of steam referred to hydrogen may be determined from its molecular weight, and the specific gravity referred to air may then be calculated from the known specific gravity of hydrogen; this theoretical value would of course be *constant for all temperatures and pressures*, and equal to 0·622. Several series of experiments to ascertain if such were the case are detailed in the paper we are now considering. The first two series of experiments were made on water-vapour *in vacuo*, and showed that the number quoted, ·622, was, within the limits of error of experiment, the true value of the specific gravity, provided the fraction of saturation of the vapour experimented on did not exceed 0·8, but the specific gravity is sensibly greater when the state of saturation is more nearly approached. The third series of experiments was made by applying the chemical hygrometric method to air artificially saturated with moisture at a known temperature. A volume of this air was made to pass through two drying tubes of sulphuric acid and pumice,‡ by means of an aspirator whose capacity was accurately determined; the gain in weight of the drying tubes gave the quantity of water-vapour contained in unit volume, and this could also be calculated from the known pressure of saturation at the temperature of the saturating vessel, assuming the theoretical value ·622 for the specific gravity of the vapour. A comparison of the results obtained serves to show whether this assumption of ·622 as the value of the specific gravity is justifiable or not.

The series comprises 68 experiments on air saturated at temperatures varying between 0° C. and 27° C. The following table shows the mean percentage difference between the observed and calculated values of the mass of moisture per unit of volume at the different temperatures:—

Temperature of Saturated Air.	Number of Experiments.	Percentage Difference.
0·0°	9	·44
14·0	9	·77
7·0	7	·86
20·5	21	·45
24·5	22	·90

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* Annales de Chimie, xv., 1845, p. 129, and xxxvii., 1853, page 257.

† This method of accounting for the discrepancies between hypothesis and experiment in reference to Dalton's law has been since confirmed by an experiment of Herwig (Pogg. Ann., cxxxvii., 1869, p. 592) upon compression of vapours. He found that the pressure of the vapour could be increased beyond the point at which a deposit was first formed on the sides of the vessel, and that the vacuum saturation pressure was the *increased* pressure, and not the pressure at which the deposit is first formed. (See also p. [57].)

‡ A number of preliminary experiments were made to verify that the sulphuric acid was efficient as an absorbent.

The differences thus tabulated lie all in the same direction, the observed weight of moisture being in each case too small. They may be accounted for in four different ways,—(1) the pressure of aqueous vapour in the saturated air may be slightly less than that given by the table of pressures *in vacuo*; (2) the density of vapour in saturated air may be less by about 1 per cent. than the theoretical density; (3) the temperature readings of the saturated space may be slightly inaccurate, errors in the temperature readings of from 0°·06 to 0°·15 C. being sufficient to account for the differences; (4) the differences may be due to the incidental errors of the experiments. The irregularity in the numbers for different temperatures tends rather to show that either of the first two suggestions is insufficient completely to account for the observations, and there is evidence that suggestion (2) is directly contradicted by experiment.* The amount of thermometric error required in each case to account for the differences is very small, and Regnault gives no details as to the method of correcting the thermometers he employed in the experiments, but his known familiarity with thermometers of every kind and their errors, makes it highly improbable that he could have overlooked these in the case before us. The precautions adopted in order to secure the observations against the possible sources of error that are suggested by the arrangement of the apparatus are not definitely stated.

A table of results of some experiments to determine by the same method the specific gravity of saturated steam at temperatures above that of the air of the room is also given, but their author does not regard the result as satisfactory.†

The second part of the memoir considers the various methods employed to determine the fraction of saturation of the air. The chemical method is passed over, as being fully discussed in the previous part of the memoir.

Hair hygrometers.

With regard to the behaviour of de Saussure's hair hygrometer, Regnault set himself to determine whether the indications of hair hygrometers are strictly comparable under the following different conditions:—

1. When they are constructed of the same kind of hair, prepared at the same operation.
2. When they are constructed of different kinds of hair, but prepared at the same operation.
3. When they are constructed of different kinds of hair and prepared by different operations in different processes.

A considerable number of hygrometers were compared with each other, their "fixed points" being determined by means of saturated air, and air dried by sulphuric acid. The results are summed up by Regnault as follows:—

"Two hygrometers, mounted with similar hair, may be non-comparable solely on account of their not being stretched by equal weights."

"Hygrometers constructed with hair of the same kind, prepared at the same operation do not give identical results, but they do not differ to such an extent that, for the majority of observations, they may not be regarded as comparable." The maximum difference between different instruments was about three hygrometric degrees.

"Hygrometers constructed with hairs of different kinds and prepared in different ways may show very great differences in their indications, even when they agree at the fixed points."

It is consequently impracticable to construct a single table for the calculation of results which is applicable to all instruments, and it is desirable that observers should have at their disposal a simple process which enables them to make for themselves a table for their own instrument and by which they can verify the graduation of the instrument as often as they wish.

With this object Regnault proposes to enclose the hygrometer in a cylindrical vessel at the bottom of which can be placed successive layers of mixtures of sulphuric acid and water of different known strengths; he gives formulæ and tables for the pressure of aqueous vapour due to such solutions at different temperatures. The process of forming a scale for the hygrometer is described. Regnault proposes to abandon the attempt to determine the point of the scale corresponding to absolute dryness, and indeed to use instead the fractional humidity of about ·20, as given by a suitable solution of sulphuric acid. The effect of changes of temperature upon hair hygrometers was not determined, in consequence of the breaking of the apparatus intended for that purpose. (See p. [81].)

Regnault gives as his final opinion about hair hygrometers, in his second memoir: "Il est à désirer que les " observateurs renoncent définitivement à un appareil sur le bon état duquel ils ne peuvent jamais compter."‡

After laying down the following objections to Daniell's hygrometer, viz.:—

Condensation hygrometers.

1. The temperature indicated by the thermometer may be different from that of the surface upon which the deposit is formed.
2. The observer is too close to the instrument.
3. The evaporation of the ether on the bulb may alter the temperature and hygrometric state of the air.
4. The ether generally contains some water, which evaporates and changes the hygrometric state of the neighbouring air still more.
5. In dry weather it is generally difficult, and sometimes impossible, to get a deposit of dew at all.

Regnault describes his own instrument, proposing to produce the evaporation of the ether in the capsule by causing air to bubble through it by means of an aspirator, which enables one to adjust the temperature with very great nicety. No comparisons of results with those of the chemical method are given.

Psychrometer.

The memoir then describes a large number of experiments upon the pyschrometer, the object of which was to determine to what extent August's formula—

$$f = f' - \frac{0{\cdot}429\,(t-t')}{610-t'}h$$

is applicable to psychrometer observations.

It is first made clear by direct experiment that when perfectly dry air is made to pass over a dry bulb and wet bulb successively the temperature of the latter depends upon the rate at which the air passes; from this it is inferred that a similar result will be found with air more or less moist, and this is verified by direct experiment. Several sets of experiments, however, including a series upon two wet bulbs exposed in an open court 2 metres from the wall and 7 metres above the ground, one of them being supplied with a current of air of known velocity by means of a ventilating fan, and the other left to itself, lead to the following conclusions: Psychrometer observations in moving air are practically independent of the size of the bulb. The agitation of the air certainly influences the formula for the psychrometer, but when the instrument is exposed to free air the same formula can be adopted, so long as the velocity of the wind does not exceed 5 or 6 metres per second.

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* For another suggestion as to the cause of the difference based upon my own observations, see § 14 (ante).

† Regnault sums up this part of his work in the following words:—

"Quoi qu'il en soit, on voit qu'en prenant pour base ma table des forces élastiques de la vapeur aqueuse dans le vide, et admettant que la densité de la vapeur est constamment égale à 0·622, celle de l'air dans les mêmes circonstances étant 1, le poids de la vapeur d'eau calculé ne peut différer de la quantité réelle que d'une fraction très-petite, un centième environ."

‡ Annales de Chemie, xxxvii., 1853, p. 258. (For later information about the hair hygrometer, see p. [81].)

Regnault suggests the advisability of determining only the form of a reduction formula theoretically, and then assuming constants determining their values by actual comparison with some other method.

His psychrometer observations were all reduced to absolute measure by comparison with the results of the chemical method, and in consequence of the comparison the constant of August's formula was altered, so that it became—

$$f = f' - \frac{0{\cdot}480\,(t - t')}{610 - t'}\,h.$$

This represents very satisfactorily the results obtained for fractions of saturation exceeding ·40.

For values of t' below 0° C. the number 610 must be replaced by 689.

Observations by M. Izarn in the Pyrenees are quoted to show the applicability of the formula at high-level stations.

The second memoir (Annales de Chimie, xxxvii., 1853) is mainly devoted to the discussion of the formula for reduction of psychrometer observations.

August's theoretical formula recast and calculated with the new values of the constants which Regnault was then able to supply (regarding the latent heat of vaporisation of water at temperatures likely to occur in meteorological observations as being constant and equal to 600) becomes—

$$x = f - 0{\cdot}000635\,(t - t')\,\mathrm{H}\,;$$

But instead of using this formula for calculating his results, Regnault assumes the form—

$$x = f' - \mathrm{A}\,(t - t')\,\mathrm{H},$$

and determines the value of the constant A for psychrometers exposed in such situations as are likely to give rise to various conditions, by obtaining simultaneous readings of the humidity by means of the chemical method.

The mean results of his various series of experiments are given in the following table :—

Number of the Series.	Number of Experiments in the Series.	Situation of the Psychrometer.	Barometric Range during the Series, in mm.	Range of Dry-Bulb Temperature during the Series.	Range of Fractional Humidity.	Most suitable Value of A.	Extreme Percentage Error.		Mean Percentage Error.
							Positive.	Negative.	
1	10	Closed room, 100 cubic metres.	755 to 760	21°·4 C. to 23°·4	·480 to ·588	0·00128	+2·3	−3·3	1·7
2	8	Closed room, 1,000 cubic metres.	735 „ 765	8·06 „ 15·25	·589 „ ·758	0·00100	4·3	1·6	1·5
3	7	Same room as No. 2, but with two opposite windows open.	751 „ 756	13·01 „ 17·49	·452 „ ·672	0·00077	1·1	0·9	·4
4	41	The large open court of the Collège de France, 1,000 square metres in area. [Protected from the sun; 7 metres above ground, and 2 metres from the wall.]	748 „ 764	7·16 „ 29·78	·197 „ ·745	0·00074	6·1	6·6	2·7
5	15	The long court of the Collège de France, planted with trees.	748 „ 772	0·85 „ 9·84	·624 „ ·984	0·00100	10·5	2·0	2·8
6	9	Same locality, but exposed to full sunshine.	759 „ 762	29·06 „ 30·46	·228 „ ·328	0·00090	10·7	10·0	
7	16	Same locality - -	739 „ 774	−7·63 „ −0·13	·611 „ ·879	0·00075*	11·8	2·8	
8†	16	The large court of the Taverne inn, Eaux Bonnes, Pyrenees.	694 „ 703	10·43 „ 26·15	·350 „ ·780	0·00090	2·3	2·6	
	18	Pyrenees - - [Sometimes exposed to sun.]	644 „ 649	9·52 „ 23·67	·417 „ ·980	0·00090	9·5	8·6	

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* For degrees of saturation above ·7 the number quoted is apparently too small for ice-covered bulbs; the number A = 0·0013 would have been more suitable for such observations.

† Experiments of M. Izarn.

The conclusion which Regnault draws from these series of observations is that the psychrometer may be satisfactorily employed, and give the fractions of saturation to within one-fortieth, provided that it be regarded as an empirical instrument. The instrument should be protected from the direct action of the wind, and its indications should be interpreted by means of a formula similar in form to the one given, the constant A being determined for each locality where observations are to be taken, and, if necessary, a different value should be taken for different parts of the scale.

Psychrometer, Vogel, 1860.

A series of experiments to compare the indications of the psychrometer in a closed room with the results of the chemical or Brunner's hygrometric method was made by Vogel. (Abhandlungen der Münchener Academie, VIII., 1860, p. 295.) The wet bulb was read as it stood at rest, and also after it had been swinging pendulum fashion at the end of a string. The mean of differences observed between the stationary and vibrating readings was 0°·59. It is difficult to follow the results of the 75 experiments included in the table, in consequence of the unusual units employed. The results are, however, more widely divergent than Regnault's. Regnault's constant A is calculated for each observation, and its value varies between ·00217 and ·00094.

The errors from the true percentage humidity (as given by the chemical method) lie between +2 and + 13 for the swinging instrument, their mean value being 7·4.

Psychrometer, Noble and Campbell, 1855.

The subjoined table for computing the dew-point from psychrometer observations is extracted from a letter from Lieutenant Noble, of Toronto, published in the Proceedings of the Royal Society, vol. vii., 1855, p. 528. It was obtained by means of simultaneous observations with Regnault's hygrometer. The factor, *f*, of the second column, (corresponding to the Greenwich factor*) is that by which the difference of temperatures of the wet and dry bulb must be multiplied in order to give the difference between the air temperature and the dew-point, the formula being $T = t - f(t - t')$.

TABLE OF FACTORS by NOBLE and CAMPBELL.

Temperature of Air (t).	Factor (f).	Number of Observations.	Probable Error of a single Datum.
48° to 51° F.	2·31	21	·30
46 „ 47	2·38	13	·26
42 „ 45	2·53	41	·40
40 „ 41	2·63	17	·41
38 „ 39	2·83	25	·48
34 „ 37	3·02	64	·43
32 „ 33	3·33	25	·63
30 „ 31	3·81	22	·61
28 „ 29	4·40	27	·66
24 „ 27	5·46	43	·82
22 „ 23	6·06	15	1·20
20 „ 21	6·93	6	1·40
18 „ 19	7·13	21	1·44
16 „ 17	7·60	20	1·76
14 „ 15	8·97	17	1·72
12 „ 13	10·30	20	2·53
10 „ 11	11·50	11	2·19
8 „ 9	13·06	8	4·63
6 „ 7	15·20	7	3·66
0 „ 5	16·23	14	1·87
− 1 „ − 4	19·37	10	4·11
− 5 „ − 10	21·64	6	4 65
− 11 „ − 16	37·83	6	10·96

This method of reducing results is quite different from those already mentioned, and is therefore only comparable with them by taking some actual observations and applying each method. Nothing is said in the letter as to the manner of exposure of the wet bulb, except, parenthetically, that the thermometers were protected from the full force of the wind. It would appear, therefore, that the table should correspond to Regnault's value of A = ·00074.

Noble points out that the factors for temperatures below the freezing point do not coincide with those deduced from the Greenwich observations. Without assigning any cause for the difference, he mentions two circumstances which may bear upon the question:—

1. If the air be a little above and has been below 32° there will frequently be found a small button of ice at the foot of the wet-bulb thermometer which is not easily perceived, and which will keep it at 32° when the temperature of evaporation is really above that point.

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* See Note D., p. [85].

Kämtz, 1861.

2. The water may be cooled below 32° without freezing.

The hygrometric methods have also been discussed by Kämtz, in a paper published in Kämtz, Repertorium, Vol. II., pp. 341 to 361. I have (December 20, 1887) only lately seen the original paper; the following notes are taken from an abstract given in the "Fortschritte der Physik" for 1861.

Comparing Regnault's hygrometer in the original form with one consisting of glass test-tubes silvered inside, and with Daniell's, and testing the results by the chemical method, Kämtz prefers the test-tube form of Regnault, and considers that the difference of radiation and the difference in the surface may account for different temperatures at which dew is deposited.

Concerning the psychrometer, we have a discussion of a large number of observations by this method, including the Greenwich observations and some of Regnault's, as well as his own.

Taking the general theoretical psychrometric formula—

$$e = \frac{1 + \alpha\tau}{1 + \beta\tau} e_1 - \frac{\alpha + \tau}{1 + \beta\tau} h$$

(where e is the required pressure of vapour, e_1 the pressure at the temperature of the wet-bulb, τ the psychrometric difference, h the barometric height, and α and β are constants), instead of adopting Regnault's approximate formula—

$$e = e_1 - \frac{0{\cdot}429\,\tau}{610 - t_1} h,$$

Kämtz expands the general form in powers of τ; thus—

$$e = e_1 + \alpha\tau e_1 + \beta\tau + \gamma\tau^2 + \delta\frac{\tau d}{745},$$

where $d = 745 - h$.

The various series of observations were then separately employed to determine the constants of this formula, with the following results:—

A. Regnault's observations (with a large psychrometer)—

$$e = e_1 - 0{\cdot}6698\,\tau + 0{\cdot}015253\,\tau e_1 - 0{\cdot}00522\,\tau^2 + 0{\cdot}58299\,\tau\frac{745 - h}{745}.$$

B. Regnault's observations (small psychrometer)—

$$e = e_1 - 1{\cdot}24442\,\tau + 0{\cdot}05881\,\tau e_1 + 0{\cdot}009006\,\tau^2 + 0{\cdot}58299\,\tau\frac{745 - h}{745}.$$

C. Greenwich observations—

$$e = e_1 - 0{\cdot}27842\,\tau - 0{\cdot}02309\,\tau e_1 + 0{\cdot}002437\,\tau^2 + 0{\cdot}58299\,\tau\frac{745 - h}{745}.$$

D. Kämtz observations. Psychrometer and Daniell's hygrometer comparisons—

$$e = e_1 - 0{\cdot}64569\,\tau - 0{\cdot}003861\,\tau e_1 + 0{\cdot}012397\,\tau^2 + 0{\cdot}73932\,\tau\frac{745 - h}{745}.$$

E. Kämtz. Chemical method and psychrometer—

$$e = e_1 - 0{\cdot}50051\,\tau - 0{\cdot}021641\,\tau e_1 + 0{\cdot}015548\,\tau^2 + 0{\cdot}58299\,\tau\frac{745 - h}{745}.$$

F. Condensation experiments—

$$e = e_1 - 0{\cdot}67894\,\tau - 0{\cdot}0045928\,\tau e_1 + 0{\cdot}010690\,\tau^2 + 0{\cdot}58299\,\tau\frac{745 - h}{745}.$$

G. All the observations together—

$$e = e_1 - 0{\cdot}57515\,(t - t_1) - 0{\cdot}005989\,(t - t_1)\,e_1 + 0{\cdot}002664\,(t - t_1)^2 + 0{\cdot}58899\,(t - t_1)\frac{745 - h}{745}.$$

Apart from the concordance of the barometric correction, there is nothing in these formulæ that seems to indicate any advantage in introducing the additional constants, nor does the reduction of observations, specimens of which are given, by means of them, make them any more reassuring; the differences in the pressure calculated by the different formulæ amount frequently to 20 per cent. of the whole, and Kämtz assigns one-sixth as the extreme error probable in using the general formulæ, G. He points out that the size of the bulb has some influence on the reading, and considers that comparable results are only to be obtained by making comparisons between the separate instruments and the condensation or the chemical method.

To another paper by Kämtz on the psychrometer below the freezing point, in Kämtz's Repertorium, Vol. III., I have not been able to obtain access,* nor yet to "Observations Anormales des Psychromètres" (Bull. Soc. Vaud., Vol. ix., p. 234) or the "Rapport de la commission hygrométrique" (Actes de la Soc. Helvétique des Sciences Naturelles, 1866).

Psychrometer. Chistoni, 1878.

Chistoni, at the request of the Italian Meteorological Office, undertook a comparison of the ordinary psychrometer and a ventilation psychrometer with a standard hygrometer. The ventilation psychrometer is an instrument provided with two centrifugal fans on the same axle driven by clockwork. Each fan leads to a separate vertical tube, and the bulbs of the two thermometers are placed in the mouths of these tubes, so that air passes over them at a rate which is sensibly constant, and the same at each observation. The experiments were carried out at Ostiano. Regnault's hygrometer was chosen as the standard instrument with which to compare the psychrometers for the following reasons:—(1.) The chemical method was too cumbersome for use in the country; (2.) Belli's standard hygrometer might be supposed to affect the air in its neighbourhood by its large cold mass. The air was drawn through Regnault's hygrometer by means of a very ingenious aspirator formed by allowing sand to fall from a cloth funnel down a long vertical tube, and provided simply with a side opening connected with the hygrometer.

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* Since the above was written I have seen the paper. The chief points of it are referred to in the extracts quoted from Pernter's memoir (p. 80). Kämtz proposes to add 0°·5 C. to the observed psychrometric difference for ice-covered bulbs.

The observations were made in a school-room with three windows, with two psychrometers, each used in turn as a ventilated and non-ventilated instrument. They were reduced by the "Tavole ad uso della meteorologia."*

A summary of the results is given in the following table:—

Instrument.	Size of cylindrical Bulb.	No. of Observations.	Range of Barometer.	Range of Dry Bulb.	Range of Humidity.	Extreme Error from Regnault, per cent.	Absolute mean Error per cent.
No 1. Ventilated -	6 mm. × 25 mm.	46	750–766	12° to 30°	30 to 70	(Cir.) 10	(Cir.) 2·6
No. 2. Ventilated -	6 „ × 69 „	51	„	„	„	„ 7	„ 2·8
No. 1. Unventilated -	6 „ × 25 „	51	„	„	„	„ 15	„ 6·6
No. 2. Unventilated -	6 „ × 69 „	40	„	„	„	„ 14	„ 5·8

The constant A of Regnault's formula was calculated for each of the ventilator observations; its value varies between 0·00072 and 0·00098 for No. 1, and between 0·00069 and 0·00110 for No. 2. These results are strong evidence in favour of the ventilation method.

The wet bulbs were covered with muslin and moistened before each observation, so that the results are not necessarily applicable to cases in which the wet bulb is kept continually moist by means of a wick or other capillary arrangement.

Chistoni extended his observations to temperatures of the dry bulb below 15° C. in the winter months of 1877–8 at Pavia. The summary is as follows:—

Instrument.	Size of Bulb. (Cylindrical.)	No. of Observations.	Range of Barometer.	Range of Dry Bulb.	Range of Humidity.	Extreme Error from Regnault (per cent.).	Absolute mean Error per cent.
No. 1. Ventilated -	6 mm. × 25 mm.	69	739–765	−1·2 to 19·6	44 to 92	(Cir.) 15	(Cir.) 3·3
No. 2. Ventilated -	6 „ × 69 „	69	„	−1·0 „ 18·9	„	„ 13	„ 2·6
No. 1. Not ventilated	6 „ × 25 „	70	„	−3·7 „ 19·4	„	„ 22	„ 5·0
No. 2. Not ventilated	6 „ × 69 „	70	„	−3·6 „ 19·4	„	„ 18	„ 3·7

The values of the constant A of Regnault's formula lay between 0·00062 and 0·00233 for No. 1, and between 0·00060 and 0·00199 for No. 2.

Chistoni has continued his work by making a series of comparisons between the ventilated psychrometer and Regnault's hygrometer readings for temperatures below 15° C. The observations published in the Annali della Meteorologia for 1879 comprise 191 comparisons for temperatures mostly below 15 C., when the wet bulb stood above 0° C.; 32 comparisons when the psychrometer was in the so-called critical state, *i.e.*, when the dry bulb stood above 0° C. and the wet bulb below that temperature, and 32 comparisons when the dry and wet bulbs were both below zero. The observations were made at Collio, where the mean barometric pressure for the six months over which the observations lasted was 680 mm.

The following table is taken from Chistoni's paper:—

Temperature Interval.	Maximum actual Positive Error from Regnault.	Maximum actual Negative Error from Regnault.	Mean absolute Error.
$t<0$ $t'<0$	19	29	9·8
$t>0$ $t'<0$	20	51	13·1
$t>0$ $t'>0$	21	29	6·4

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* See below, p. [85].

The errors given are the actual errors in the computed humidity. I have not calculated the percentage errors; a rough idea of them may be got by taking the humidity at 50, when the percentage errors would require each number given in the columns of the table to be multiplied by 2.

These errors are very serious; they are only briefly discussed in the paper; the generalization is made, namely, that the errors are positive and small when the humidity is great, and they are negative and larger when the humidity is small. The psychrometer observations were reduced, as before, by means of Haeghens' "Tavole ad uso della Meteorologia."

Psychrometer theory.

Chistoni has also published* a paper discussing the various psychrometrical formulæ and their application. He first explains that the assumptions made by August and others in order to obtain a theoretical formula cannot practically be justified, and he then deduces the formula originally given by Belli† and supplies it with the more accurate values of the constants obtained since Belli's time, and reduces it by omitting negligible quantities to the form :—

$$f = f' - \frac{(0{\cdot}237\,\mathrm{B} - 1{\cdot}79)(t - t')}{377{\cdot}2 - 0{\cdot}490\,t'}.$$

Following Regnault's suggestion that the theoretical formulæ should be regarded only as general forms, he has the three following—

Regnault's form, $f = f' - \mathrm{A}\,(t - t')\,\mathrm{B}$ - - - (1.)

Belli's form, $f = f' - \dfrac{(m\,\mathrm{B} + n)\,(t - t')}{1 + p\,t'}$ - - (2.)

August's form, $f = f' - \dfrac{m\,(t - t')\,\mathrm{B}}{n - t'}$ - - - (3.)

to these he adds as a suggestion—

$$f = f' + m\,(t - t')\,\mathrm{B} + n\,(t - t')^2\,\mathrm{B}^2 \quad \cdot\ (4.)$$

Where A, m, n, p are constants to be determined by experiment.

He then applies these four formulæ to the computation of the pressure of aqueous vapour from psychrometric observations, determining the constants by the method of least squares, using the results given by Regnault's hygrometer as standards. He then tabulates the errors; if we denote by Δf_1 Δf_2...the errors from Regnault of the formulæ (1) (2)... we get the following values for the mean absolute error, *i.e.*, the mean of the errors without regard to sign :—

$\Delta f_1 = 0{\cdot}33$ mm.
$\Delta f_2 = 0{\cdot}32$ „
$\Delta f_3 = 0{\cdot}29$ „
$\Delta f_4 = 0{\cdot}25$ „

He concludes that his own suggestion most nearly represents the actual case, but at the same time he remarks that the psychrometric method is, so far as he can see, not capable of giving the pressure of aqueous vapour to within 0·1 mm.

Psychrometer observations. Cantoni, 1878.

Certain practical points with reference to psychrometer observations are discussed in a paper by Cantoni.* By a series of observations upon the temperature of the air as recorded by thermometers exposed freely to the sun, or protected by various screens or metallic tubes, he shows that the best results are obtained without screens, provided that a current of air is made to pass over the bulbs, and a similiar advantage results in the case of a thermometer which has its bulb covered with a thin layer of any material. From this he is led to test the effect of ventilation upon the psychrometer, and the observations given show a considerable depression of the temperature of the wet bulb in consequence of the current of air produced by the double-fan arrangement by the Tecnomasio of Milan. Belli originally suggested the reading of wet-bulb thermometers contained in a metal tube through which air was driven, and the suggestion was practically carried out in an instrument designed by Buzzetti, but the new arrangement of the Tecnomasio gave a much stronger current than the original apparatus of Buzzetti, and from Cantoni's observations it would appear that the temperature of the wet bulb might be depressed often more than a whole degree by the stronger current of air.

Angot, 1880.

A further contribution to the discussion of psychrometric observations has been made by Angot,‡ whose report is printed in full in the Annales du Bureau central météorologique, 1880. Starting from Regnault's general form—

$$x = f' - \mathrm{A}\,(t - t')\,h,$$

and writing it,

$$\mathrm{A} = \frac{f' - x}{h\,(t - t')},$$

he determines the value of A for each of 3,670 comparisons between psychrometer and dew-point observations made at Paris (height 40 metres), at the observatory of the Puy de Dôme (height 390 metres), or at the station on the summit of the Puy de Dôme (height 1,470 metres). Of these, 282 observations gave the temperature of the wet bulb below 0° C. The range of the wet-bulb temperatures was from $-20°{\cdot}5$ to $+23°{\cdot}6$ C., and the difference of the wet and dry-bulb readings reached 16° C. The dew-point instrument was Alluard's modification of Regnault's arrangement.*

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* Memorie e Notizie della Meteorologia Italiana, 1878.
† See Pernter's paper, quoted below.
‡ Journal de Physique, vol. I., 1882, p. 119.

Having thus obtained a series of values for A, Angot found the mean of the values for temperatures of the wet bulb lying between 0° C. and 1° C., between 1° C. and 2° C., and so on for each station.

The means in every case showed that the value of A depended on the value of $t - t'$. The following is cited as an example :—

Puy de Dôme (Plain).	A.
$t - t'$.	$t' = 6^{\circ}{\cdot}42$.
$0^{\circ}{\cdot}35$	0·001022
1·43	0·000948
2·41	0·000821
3·40	0·000818
4·40	0·000792
6·77	0·000705

He therefore assumed that A was a function of $t - t'$ and writing—

$$A = a + b\,(t - t')$$

determined the values of a and b for each series by Cauchy's method, giving to each equation a weight equal to the number of observations from which the values A and $t - t'$ were obtained.

The 36 values of b thus obtained presented no regular variation, whether arranged with reference to $t—t'$, t', or h.

He therefore supposed b to be constant and found it equal to — 0·000028.

The values of a increased when t', and consequently f', increased, and when h diminished and could be represented by the equation—

$$a = 0{\cdot}000776 + 0{\cdot}0159\ \frac{f'}{h}.$$

The pyschrometric formula therefore became—

$$x = f'\ \left[1 - 0{\cdot}0159\,(t - t')\right] - 0{\cdot}000776\,h\,(t - t')\left[1 - 0{\cdot}0361\,(t - t')\right]$$

for temperatures above 0° C., and

$$x = t'\left[1 - 0{\cdot}0159\,(t - t')\right] - 0{\cdot}000682\,h\,(t - t')\left[1 - 0{\cdot}0411\,(t - t')\right]$$

for temperatures below 0° C.

From these formulæ tables have been constructed ; these are not given in the abstract in the Journal de Physique, but a diagram which serves the purpose is appended at the end of the paper.

The results with these tables seem to be very satisfactory, as compared with those given by Haeghens' tables. The mean percentage error of 90 observations at Paris being + 1·1 by the latter and only – 0·5 by the former ; while for 91 observations of Chistoni's the mean error by the old tables is + 2·5, and by Angot's only + 0·5 ; and further, applying the new tables to Regnault's observations below the freezing point, the mean error is only + 0·7, as compared with + 3·5 obtained when Regnault's formula is employed. On the whole Angot states that the error of the computation from a single observation above zero is about ± 2 units in the relative humidity, and the absolute mean error of a series of some 20 to 30 observations 0·5 ; for temperatures below zero it would probably be necessary to double these figures, but at any rate even for very hot and dry regions the tables never give negative values for the humidity, which is a possibility with the old tables. No particulars are given as to the mounting and moistening of the thermometers.

Psychrometer. Exceptional observations. Blanford.

An account of an interesting series of observations with the psychrometer in very dry atmosphere is given by H. F. Blanford in the "Journal of the Asiatic Society of Bengal," Vol. XLV., 1876. The observations were taken in various stations in India, and the dew-point was computed from them by Apjohn's formula,† by Glaisher's factors, and by August's theoretical formula‡ supplied with Regnault's values of the constants occurring therein and adapted to English units. The thermometers were either a pair with small pea bulbs or a pair of Casella's Kew pattern, with small spherical bulbs. Particulars are given with reference to the verification of their indications.

The wet bulbs were exposed either (1) in a thermometer shed, *i.e.* "in a frame with one or two cross bars (generally "protected by wire netting at back and front) under a thatched shed open on all sides to the wind," or (2) by the "sling" method. For the Upper India series the bulbs were covered with a single thickness of old thin calico. A water bottle was placed 2 inches to the side of the bulb with the water level a quarter-inch below it and communication was made by a well-washed lamp-wick of some dozen threads of coarse yarn.

The dew-point instrument was Casella's form of Regnault.

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* See below, p. [82].

† $x = t - \frac{t' - t}{88} \cdot \frac{h}{30}$.

‡ $x = f - \frac{0{\cdot}480 \times \frac{5}{9}\,(t - t')}{610 - \frac{5}{9}\,(t' - 32)}\,h = f - \frac{0{\cdot}480\,(t - t')}{1130 - t'}\,h\,.\ (t' > 32^{\circ})$.

"Assuming the direct dew-point determinations to be correct, the following are the errors shown by the several computations:—

Place.	Series.	No. of Observations.	Mean Air Temp.	Mean Wet Bulb.	Dew-point below Air.	Barometer.	Errors.			Conditions.
							Aug.	Apj.	Glaish.	
Secunderabad -	1	6	92°·4	67°·9	44°·7	28·07	+2·5	+6·1	+5·4	In thermometer shed.
" -	2	1	93·4	70·1	41·0		+3·3	+5·9	+3·4	
" -	3	6	94·8	70·6	44·0		+4·9	+8·0	+5·6	
" -	4	12	92·7	69·6	41·9		+3·9	+7·0	+4·6	
Bellary - -	5	7	94·0	69·7	40·7	28· 4	−0·4	+2·8	+0·9	Do.
" - -	6	2	94·7	68·9	? 37·0		? −7·0	? −3·3	? −4·7	
" - -	7	8	94·7	68·4	43·7		−2·0	+1·9	+0·9	
" -	8	9	95·8	66·6	48·3		−4·6	+0·6	+1·6	
Coimbatoor -	9	8	96·8	68·9	48·1	28·39	+0·5	+4·6	+3·8	Do.
" -	10	1	96·4	68·5	49·6		+1·9	+6·1	+5·5	
" -	11	10	95·3	69·9	42·9		+0·3	+3·8	+1·9	
Trichinopoly -	12	6	89·6	77·2	18·5	29·35	+0·7	+1·7	−1·6	In verandah. Sling thermometer.
Madras - -	13	5	97·0	74·1	31·1	29·72	−0·3	+2·3	−0·5	Do. Do.
Calcutta - -	14	9	84·2	79·4	13·0	29·60	−0·4	−0·1	−1·6	In sitting room. Do.
" - -	15	12	83·8	79·7	6·3	29·55	+0·5	+0·8	−0·5	
Allahabad -	16	1	77·4	61·2	29·3	29·54	+0·2	+3·0	+2·9	In verandah.
" - -	17	5	87·3	65·2	41·4	29·45	+1·8	+5·4	+5·5	
Agra - -	18	7	86·1	60·8	45·1	29·35	−6·1	−0·2	+3·7	Do.
Lahore - -	19	8	82·9	62·3	42·9	29·08	+4·6	+8·2	+8·7	Do.
" - -	20	8	73·0	55·6	35·4	29·18	−2·9	+1·4	+3·2	In thermometer shed.
" - -	21	7	74·9	56·9	37·6	29·18	+0·8	+4·6	+6·7	
Mean - -	—	—	—	—	—	—	+0·46	+3·70	+3·00	

The results show that August's formula gives the dew-point from psychrometer observations with considerable accuracy, even when the dew-point is very far below the temperature of the air. The further conclusion to be drawn from the observations is already made clear, namely, the necessity for the exposure of the wet-bulb to a sufficient current of air. The readings are too high by all the computations when the exposure was in the verandah or room.

Blanford does not regard his dew-point observations as unexceptionable, and calls attention, among other practical points in connection with this observation, to the necessity for a highly burnished surface for the thimble and freedom from microscopic scratches, as these make it very difficult to seize the moment of definition when the humidity is very small and amount of deposit consequently light.

Psychrometric theory. Maxwell.

The attempts at deducing theoretically a formula for the computation of psychrometric observations, to which allusion has hitherto been made, have been based upon the assumption that there was a continuous replacement of a layer of air, no matter how thin, surrounding the wet bulb. This layer of air was supposed to be reduced to the temperature of the wet bulb, and completely saturated with moisture. The effect of the varying rapidity of motion of the air was not taken into account, and the effect of radiation was regarded as insensible. An equation is obtained by August, Apjohn, and others, between the amount of heat supplied to the surrounding air and the amount lost by the evaporating liquid. Belli, on the other hand, equates the mass of air reduced, per unit time, from the temperature, t, of the dry to the temperature, t', of the wet bulb, to the mass of air saturated by evaporation per unit time. This slight divergence between the methods of obtaining the equation leads to no difference in the results, because the theory evidently represents ultimately the same physical state of things. The matter is, however, treated from a different point of view in Maxwell's article on Diffusion in the Ency. Brit. (ix. edit.). In the discussion of the physical problem, as there treated, he considers a "steady" distribution of moisture and temperature round the wet bulb, supposed to be maintained in a perfectly still atmosphere of indefinite extent, the distribution of heat and moisture being brought about by conduction, radiation, and diffusion. Maxwell calls this the conduction and diffusion theory in calm air, in contradistinction to the convection theory referred to above. The mathematical solution is identical in form with that of the corresponding electrical problem to find the distribution of potential, due to a charged body in a field, and consequently, with the correction for radiation, leads to the following equation—

$$p_0 = p_1 - \frac{\mathrm{P\,S}}{\mathrm{L}\sigma}\left\{\frac{\mathrm{K}}{\mathrm{D}} + \frac{\mathrm{A\,R}}{4\pi \mathrm{C}_\rho \mathrm{S\,D}}\right\}(\theta_0 - \theta_1),$$

where p_0 is the vapour pressure in the air undisturbed by the presence of the wet thermometer bulb.
p_1 is the vapour pressure at the surface of the bulb.
P the whole pressure of the air.
S is the specific heat of the air.
L is the latent heat of the vapour at the temperature θ.
σ is the specific gravity of the aqueous vapour referred to air.
K is the coefficient of thermal conductivity of the air.
D the coefficient of the diffusion of the vapour.
R is the coefficient of radiation per unit of surface of the bulb.
A is the area of the bulb.
C is identical with the electrostatic capacity of the bulb, and is therefore equal to the radius for a spherical bulb.
ρ is the mass per unit of volume of air.
θ_0 the temperature of the air undisturbed by the wet bulb, *i.e.*, the dry-bulb temperature.
θ_1 is the wet-bulb temperature.

This equation, which has also been obtained by Stefan, for a spherical bulb, differs from the convection formula, which is $p_0 = p_1 - \frac{\mathrm{P\,S}}{\mathrm{L}\sigma}(\theta_0 - \theta_1)$, only by the factor in the last term. The factor $\frac{\mathrm{K}}{\mathrm{D}}$ is said, by Maxwell, to be less than unity, and probably about ·77. Stefan, in the "Zeitschrift der Oesterr. Gesellsch. für Meteorologie," vol. xvi., 1881, assigns the value unity to $\frac{\mathrm{K}}{\mathrm{D}}$. He, moreover, deduces the special case of the formula for a rotational ellipsoidal bulb.

It appears from the formula that for spherical bulbs the effect of radiation is proportional to the diameter of the bulb. Further, if we take account of convection currents, their effect would practically be to increase R and D, keeping their ratio constant, so that the relative importance of the radiation term would be diminished by the effect of a current of air.

The application of this formula is further considered by Pernter,* who points out that the usual assumption that the effect of radiation is negligible leads to serious error for bulbs of considerable magnitude. Substituting in the formula, he finds that for still air the radiation effect is equal to the conduction and diffusion effect if the radius of the bulb (supposed spherical) is equal to 0·57 cm. With a convective current the effect of radiation would diminish, so that for a current of given velocity the formula might be written—

$$p_0 = p_1 - \mathrm{A\,P}\left(1 + \frac{1}{a}\right)(t - t')$$

Psychrometer. Exceptional case. Pernter, 1883.

where A is a constant and probably equal to 0·000630, a is constant for a given velocity of the air, and for a given pressure. Its value, as deduced from a consideration of observations by Blanford, Angot, Chistoni, and the author of the paper, is 3·0 P/760. Moreover, Pernter considers a certain further correction in the following paragraphs, which I have translated directly from his memoir:—" A further influence, of which no account was taken in " the formula, lies in the muslin covering of the wet thermometer. In establishing the formula no regard was had to " any such effect. Kämtz has, however, called attention to the frequent case, which he had occasion to observe, that " the moist thermometer stood sometimes as high, sometimes higher, than the dry, when a comparison with the hygrometer did not show a saturation of the air with water vapour. He had investigated the cause of this phenomenon, " and had found it in the muslin covering of the wet thermometer. According to his experiments at low temperatures, " the wet thermometer stood 0°·46 C. too high.

" That this should be an effect of radiation, as is no doubt the case with dry muslin, would require as a consequence " that the radiation effect should increase with increase of the difference $(t - t')$. The fact is, however, that this effect " in proportionate comparisons diminishes (mehr verschwindet) as $t - t'$ becomes greater, at any rate in moving air. " This behaviour will require further searching investigation. I will, however, at present mention that I am of opinion " that this phenomenon is to be ascribed to an 'inertia' of the wet thermometer when near the saturation point of air, " so that in very moist air the evaporation does not take place rapidly enough in relation to the in-rushing air. This is " confirmed also by experiment. If account is to be taken of this 'inertia' of the psychrometer in the formula, a " correction can be so applied to the psychrometer difference $(t - t')$, that it is a maximum when $t - t' = o$, and is " chosen inversely proportional to the difference $(t - t')$. If v be the maximum value, this correction would be " $= \frac{v}{t - t' + 1}$; if we, with Kämtz, take $v = 0°·5$ C., this correction will only be of appreciable value up to " differences of 9°, practically only up to those of 6°."

I have translated this directly, as the point is an important one, and this is the first explanation of it that I have seen attempted, but I cannot say that I fully understand the method of introducing Pernter's correction. The quantity v is said to be the maximum value of the correction, which I should take to be the temperature excess of the wet bulb over the dry when the air is *actually* saturated, but this would evidently not be the case when $t - t' = o$. The complete formula, as thus corrected, stands thus—

$$p_0 = p_1 - \mathrm{P} \times 0{\cdot}000630\left\{1 + \frac{760}{3{\cdot}0\,\mathrm{P}}\right\}\left\{t - t' + \frac{0{\cdot}5}{t - t' + 1}\right\}$$

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* Sitzungs-berichte der Wiener Academie, lxxxvii., 1883.

There is evidently something wrong with this, as the condition for saturation, viz., $p_0 = p_1$ leads to the imaginary difference—

$$t - t' = - \cdot 5\{1 \pm \sqrt{-1}\}.$$

No comparisons of dew-points computed by the formula with actual observations are given, although the observations of Blanford, Chistoni, and others are discussed in the course of the paper, and the values of the constants deduced from them are given.

Pernter has also made some comparisons between the results of observations with Wild's ventilated-psychrometer and Regnault's hygrometer on the Obir (2,048 metres high); these observations are 30 in number, the dry-bulb temperature lying between 6°·2 C. and 14°·4 C., the temperature difference between 0°·6 and 3°·6, and the barometer between 591 mm. and 600 mm., so that they all refer to states of great humidity. The values of Regnault's constant A are computed for each observation; they vary between ·0008432 and ·0014946.

Hair hygrometer revival.

In spite of the recommendation of Regnault and others, the hair hygrometer has not been entirely abandoned. In 1852 Kreil used a hair hygrometer as a hygrograph and found a difference of ±4 per cent. between its indications and those of a psychrometer, but he laid some part of the errors at the door of the psychrometer. In 1858 Pichot suggested the graduation of a hair hygrometer by using always the same air, and producing changes in the humidity by changing the pressure or temperature. An improved form of hair hygrometer was introduced by Hermann and Pfister* in 1870, and during the same year R. Wolf compared the indications of two such instruments with those of a psychrometer; the results are in favour of the hair hygrometer, especially below the freezing point, inasmuch as the two hair hygrometers are nearer together than either and the psychrometer, but no comparison with a standard method was made, so that the evidence of superiority is not quite complete. In 1878 Dr. Karl Koppe of Zurich published a small book† in which the whole question of hygrometric measurement is briefly discussed and the advantages of a hair hygrometer with provision for adjustment are more elaborately described. The adjustment is carried out by means of a screw turned by a watch key, and in order to get a fixed point the hygrometer is enclosed in a metal case provided with a glass front and back. The front can be removed for observations, but for adjusting it is put in its place and the interior of the case is saturated by a wet cloth. Koppe regards hair hygrometers as quite sufficiently comparable, and gives the following particulars as to the expansion of hair by heat alone. De Saussure found an expansion for 1° R. of 19 millionths of the length of the hair, and Koppe, by observing the readings in completely saturated air at various temperatures, found no change of length indicated for changes of temperature up to 20° C.

Regnault has taken up the subject of hygrometric methods again in Carl's Repertorium, vol. viii., p. 1, 1872.‡ He, however, only recapitulates his former conclusions, adding some practical directions for applying the chemical method continuously in meteorological observatories so as to obtain the mean quantity of moisture for every three hours. Von Baumhauer,§ referring to Regnault's paper, agrees with that author in preferring the chemical method, and recalls the attention of meteorologists to an apparatus, described by him 17 years previously, intended to give continuous observations by the chemical method. It is a sort of hydrometer containing pumice and sulphuric acid, and is floated in an oil bath, and there is an arrangement for passing the air through without interfering with the free floatation.

A similar apparatus is described by Snellen.‖ I am inclined to look upon all apparatus requiring anything like a long leading tube with very grave suspicion. A sudden change in the temperature such as sometimes covers all walls and furniture with a deposit of moisture would supply a layer of water to the leading tube that would nearly saturate the air for a considerable time and render the instrument worse than useless at a time when its results are wanted to be most accurate. Von Baumhauer suggests leading air by means of a lead tube from a captive balloon to his instrument in an observing room. It is almost painful to try and think what an observation with such an arrangement would really mean.

A short paper by Lefebvre¶ gives the results of experiments to compare Regnault's hygrometer with the chemical method. One series of experiments compares the hygrometric state as given by the chemical hygrometer with that deduced from the dew-point reading of Regnault's instrument, taking the dew point to be—

(1.) The temperature of the first appearance of dew.
(2.) The temperature of disappearance.
(3.) The mean of the two preceding.

The collective results may be tabulated as follows, calling differences from the results of the chemical hygrometer errors:—

Number of observations, 15.
Range of temperature, 17°·3 C. to 24°·0 C.

Extreme error of "first appearance observations"	−2·00	in percentage humidity.
	+ ·60	" "
" "disappearance" "	−1·83	" "
	+1·18	" "
" "mean" "	−1·92	" "
	+ ·75	" "
Mean error of "first appearance" observations -	·47	" "
" "disappearance" " -	·74	" "
" "mean" " -	·55	" "

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* Carl Rep., vol. vi. p. 117.

† Die Messung des Feuchtigkeitsgehaltes der Luft. Zürich, 1878.

‡ Translation of a part of a paper entitled "Instructions pouvant servir à l'établissement des observatoires météorologiques" in the Geneva "Archives des Sciences," vol. 40, 1871.

§ Pogg. Ann., cxlviii., p. 448, 1873. (Translation of a paper in the Archives Néerlandaises, vol. 6. 1871.)

‖ Archives Néerlandaises, ix., p. 477.

¶ Annales de Chimie, xxv., 1849, p. 110.

A second set of experiments gives a comparison of two chemical hygrometers with each other and with Regnault's. I give a table of the differences in the fractional humidity between the two chemical hygrometers, and between their mean and Regnault's, the fractional humidity in each case being not far from ·50 :—

No. of Experiment.	Difference between the Fractional Humidity as given by two Chemical Hygrometers.	Difference between Regnault and the Mean of Chemical Hygrometers.
1	+ ·0007	+ ·0060
2	− ·0058	+ ·0051
3	+ ·0031	+ ·0157
4	+ ·0016	+ ·0002
5	+ ·0055	+ ·0047
6	—	—
7	+ ·0016	+ ·0018
8	+ ·0004	+ ·0062
9	—	—
10	+ ·0004	+ ·0062
11	+ ·0000	+ ·0049
12	− ·0031	− ·0087

These results are very satisfactorily concordant. The aspirator for the chemical method contained 4·278 litres, and the tubes were filled with sulphuric acid and pumice, the air was taken from out of doors, and the Regnault, placed at the window, was observed at the beginning, middle, and end of each experiment, and the mean of the three dew-point readings taken.

Observations were also taken with Daniell's instrument, but they were so discordant that they are not recorded.

New condensation hygrometer.

For many years Regnault's form of condensation hygrometer was regarded as a satisfactory standard instrument. In 1877 Alluard introduced a somewhat modified form, which was used by Angot in the researches already discussed (page [77]. The modification consisted in replacing the silver thimble by a brass tube of square section provided with various metal tubes to allow of the passage of air through the ether contained in the tube. Instead of the glass upon which Regnault's thimble was mounted, there are two windows in opposite sides of the square tube, near to the top. These enable the bubbling of the air through the ether to be watched. The sides of the tube are gilt and highly polished, and one of them is framed by a broad band of brass, gilt and polished in like manner. This surrounding band is very near to, but does not touch, the brass tube. The dew is therefore deposited on a flat gilt surface, and the identification of a deposit is rendered easier by the proximity of an unaltered surface with which to compare the cooled one.

Dines.

A dew-point instrument was also introduced in 1871, by Mr. Dines, in which the dew deposit was caused by cooled water, and took place on blackened glass; this was modified by its inventor in 1879,* so that it could be used with either water or ether.

These instruments, however, may be regarded as being intended to facilitate the reading of the dew point rather than as questioning the results given by Regnault's instrument. The case is different with a new condensing hygrometer, introduced by Crova.† This consists of a tube of thin brass, the interior of which is nickel-plated and carefully polished; one end is closed by a plate of ground glass, and the other by a lens. The air to be experimented on is drawn through this tube by means of two tubulures entering it at right angles, and the tube is cooled by surrounding it with a brass box, partly filled by carbon disulphide, through which air is made to pass. The temperature is read by means of a thermometer dipping into the liquid. The dew deposit is seen by means of the lens, and the arrangement is such that the mean temperature of appearance and disappearance can be read to less than 0°·1 C. This arrangement was adopted by Crova, because he was dissatisfied with the behaviour of Regnault's instrument when the dew-point was very low, and when there was a considerable wind.

Crova

Having arranged the instrument, he made a series of comparisons of the results of Regnault's instrument, observed in the open air or window, with those of his own, the air being in that case conducted through a fine lead tube to the instrument inside. The thermometer employed had been previously corrected.

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[*] See Symons' History of Hygrometers, Quart. Journ. Met. Soc., vii., p. 161.

[†] Journal de Physique ii., 1883, p. 166.

The following are some of the results :—

SERIES I. Wind North-east, fairly strong. Barometer 759.

Hour.	Temperature of Air.	Dew-point.	
		Regnault.	Crova.
h. m. 9 40	° 21·0	° 4·6	° 4·7
9 50	21·0	5·3	5·9
10 0	21·0	5·9	7·4
10 30	21·5	6·5	7·5
11 0	22·0	6·5	7·0
1 30	22·5	6·7	8·3

SERIES II. Wind North-west, gradually increasing. Barometer 758. Psychrometer humidity 0·54 to 0·58.

Hour.	Temperature Air.	Dew-point.	
		Regnault.	Crova.
h. m. 8 15	° 19·4	9·5	° 9·5
8 30	19·9	9·7	10·5
8 45	19·7	8·3	9·8
9 0	19·6	8·1	9·5

SERIES V. North-west to North, variable. Barometer 751. Psychrometer humidity 0·405.

Hour.	Temperature of Air.	Dew-point.	
		Regnault.	Crova.
h. m. 2 30	° 16·75	successively 2°·45 3·05 1·90 1·25	° 4·05 constant.
3 0	—	„ 2·05 1·35	5·65

These differences in the dew-point readings by the two methods are very serious, as, if this be the real state of affairs, the work done with Regnault's hygrometer as a standard instrument is so far invalidated.

Direct and indirect methods.

It will be noticed that the methods of finding the pressure of aqueous vapour in air hitherto described are all indirect: that is to say, when the instrument has done its work, a calculation has to be gone through in order to obtain the value of the vapour pressure. The dew-point method approaches, perhaps, the nearest to a direct method, but it must be remembered that what is actually observed, or rather what is supposed to be observed, is the temperature at which a deposit takes place on a certain cooled surface. It has always been assumed that this temperature corresponds to the temperature of saturation of the air, and that in consequence we may take the corresponding pressure of vapour from Regnault's table. The experiments of Regnault referred to above, page [71], do not completely justify this assumption, although the error is but small, but those of Crova just described throw doubt, for different reasons, upon this fundamental point.

The calculation of the pressure of vapour from the weight of water contained in a given volume of air—the chemical method—depends in like manner upon assumptions for which there is at present no absolute experimental verification. Such experiments as there are show discrepancies between observation and calculation which are beyond the limit of experimental errors. And yet a direct experimental determination seems in principle extremely easy. Assuming only that the pressure of dry air in moist air is independent of the pressure of the vapour, which must be assumed if we are to assign any meaning at all to the " pressure of aqueous vapour in the atmosphere," it follows that, if we abstract the moisture without altering the volume, and measure the resulting pressure of the dry air, the pressure of the vapour is simply the difference between the initial and final pressure of the air. Moreover the dry air is known to obey the law of Boyle with extreme exactitude for small variations of pressure and volume, and hence the measure of the diminution of volume of air produced by the removal of its moisture without altering its pressure furnishes an equally accurate means of finding the original pressure of the vapour. Only one stage less direct is the method of finding the

Absolute hygrometers.

increase of pressure produced by saturating a specimen of air whose volume is kept constant and assuming the saturation pressure from Regnault's tables. Calling such determinations "absolute," an instrument for making them is called an absolute hygrometer, and of these very many have been suggested by various experimenters in recent years. Before describing them, I will just mention that the simplicity of the method is entirely illusory. The differences of pressure to be measured are small, never practically exceeding 30 mm. in our climate, and being generally about 10 mm. Taking the latter amount and supposing that an accuracy of 1 per cent. is required, the pressure difference must be measured to 0·1 mm., which is less than $\frac{1}{5000}$ of the ordinary barometric pressure. Consequently the volume or the pressure must be kept constant during the measurement to the same degree of accuracy; and, since a change of temperature of 1° C. alters the volume or pressure by about ·00366 of its amount, the temperature of the apparatus must be kept constant, or its change compensated for, to within 0°·02, which is a very difficult matter. Further, any taps or connections must hold sufficiently tight to guarantee that the vessel will not lose or gain air to the extent of $\frac{1}{5000}$ of its whole volume during the course of an experiment. These are a few of the difficulties.

Schwackhöfer.

The best known of these new instruments is that of Schwackhöfer, described and figured in Jelinek's Zeitschrift for 1879. In its modified form it is an apparatus for finding the diminution of volume of air in consequence of the absorption of the vapour by sulphuric acid. The air is first enclosed in a burette, with a graduated stem communicating with a mercury cistern; the burette is then, by a suitable arrangement of taps, brought into communication with a second vessel, open at the bottom and shaped like an elongated bell, containing a number of vertical glass tubes, and filled up with sulphuric acid. The mercury is then forced by means of a plunger dipping into its cistern into the burette, and the air passes over into the second vessel, displacing the sulphuric acid, leaving, of course, a large surface of acid exposed, which dries the air after four or five transfers backwards and forwards. The sulphuric acid is then driven back to its original level, which is carefully marked; the pressure of the dried air is adjusted to be the same as before by means of an oil gauge, and the diminution of volume is read off on the graduated stem of the burette. The temperature is read by a thermometer sealed into the burette, and kept uniform by a jacket of glycerine round the burette.

I have omitted a large number of small precautions which are quite necessary in taking an observation. The apparatus is very delicate, and is therefore available only for laboratory use.

Pernter worked with an instrument of this kind. He says: "Bei fünfzig Versuche waren resultatlos, bis es mir "gelang die Hähne zu dichten, das Quecksilber luftfrei und rein zu halten und die ganze Röhre vor aller Verun-"reinigung zu schützen. Endlich, nachdem ich drei Wochen daran mich abgemüht, schienen die Versuchsergebnisse "einigermassen entsprechend. Die . . fünfzig . . Versuche lieferten alle eine zu kleine absolute Feuchtigkeit "und zwar im Mittel um 2·5 mm. circa zu klein."

A similar apparatus was used by Sworykin, who seems to have had more success with it.

An apparatus somewhat similar to Schwackhöfer's was designed and made by Mr. Dines. It is described in the "Meteorological Magazine," September 1883, and is said to work satisfactorily.

The next instrument of the kind is Edelmann's, described in Wiedemann's Annalen, vol. VI., p. 455 (1879). It is of very much simpler construction. A glass cylinder is closed at each end with india-rubber corks perforated so as to take a tube containing a thermometer and connected with a mercury pressure gauge at one end, and at the other a second tube communicating with the top and bottom respectively of a small vessel of sulphuric acid by means of glass cone joints. The mercury gauge is also attached to a cone joint; there are stop cocks between the cone joints and the cylinder. The cylinder is provided with a metal jacket. By the double connexion the sulphuric acid is allowed to run into the cylinder without altering the volume of the air. Between each operation the cylinder has to be cleaned and dried, and washing out with alcohol and ether is recommended. It is said to give good results, though none are quoted in the paper, and if, as suggested, the vessel is finally dried by passing through it air from a "Wasser-trommel-gebläse," good results ought certainly to be received with unusual gratitude. The description of the instrument, and its use, reads rather like an instrument maker's solution of the problem "to make an absolute hygrometer." Van Hasselt* has described an instrument somewhat similar to Edelmann's, but he uses phosphoric anhydride instead of sulphuric acid. The anhydride is enclosed in a thin glass bulb, which is broken by shaking when the moisture is to be absorbed; the difference of pressure is observed by means of an oil manometer, which consists of two glass tubes connected by a flexible india-rubber one. This arrangement allows the volume to be reduced to its original value before reading off the pressure.

Rüdorff† uses a Woulff's bottle, with three necks, in an ingenious manner. Into the middle neck is fixed a burette, which supplies the sulphuric acid; this is allowed to pass into the vessel until the pressure reaches its original value, as indicated by a manometer of sulphuric acid, sp. gr. 1·300. Thus the volume of sulphuric acid run in gives at once the diminution of volume of the air due to the absorption of the moisture.

This plan was somewhat improved by Neesen,‡ who has two Woulff bottles, one connected with each limb of the manometer. By this means the temperature correction is very ingeniously compensated, and, moreover, a second determination can be made with the same apparatus by using the other bottle.

Matern§ also uses the compensation by a second vessel, but the vessels are glass cylinders, provided with lids ground flat, so that they can simply be laid on. The necessary connexions, &c. are sealed into the lids. The method he suggests is that of finding the increase of pressure, due to the saturation of the air, by allowing water to drop into one of the vessels on to blotting paper. He also gives‖ a simplified form of the instrument for more rapid use.

I have not been able to find any series of observations showing the comparative results obtained with these different instruments: they have been tried by their inventors, but means of comparison are not to hand, except for Schwackhöfer's instrument, as already mentioned.

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* Beiblätter, 1879, p. 697.

† Beiblätter, 1880, p. 349.

‡ Wied. Ann. vol. XI., 1880, p. 526.

§ Wied Ann., vol. 1

‖ Wied. Ann., vol. X. p. 149.

NOTE D.

Hygrometrical Tables.

It may be useful to add a statement with reference to the tables at present in use by meteorological observers in different countries for the reduction of wet-and-dry-bulb observations. Mr. R. H. Scott has very kindly supplied me with the following list of original hygrometrical tables:—

Haeghens (Annuaire de la Société Météorologique, 1849), followed by Renou, France, and Denza, Italy.
Wild (Repertorium für Meteorologie, Bd. I., St. Petersburg, 1870), followed by Jelinek. Vienna, 1876.
Blanford.—Tables for the Reduction of Meteorological Observations in India. Calcutta, 1876.
Glaisher.—Hygrometrical Tables, 7th edition. London, 1885.
Guyot.—Psychrometrical Tables, Smithsonian Miscellaneous Collections. Washington, 1887.

Of these Haeghens' and Wild's tables are millimetre-centigrade tables founded upon Regnault's table of pressures and the psychrometric formulæ of the same authority, viz.:—

$$e' = e - \frac{0{\cdot}480\,(t - t')}{610 - t'}\,b, \qquad t' > 0^\circ \text{ C.}$$

$$e' = e - \frac{0{\cdot}480\,(t_{,} - t')}{689 - t'}, \qquad t' < 0^\circ \text{ C.}$$

Blanford's tables are based upon the same observations and formulæ, but they are adapted for English inches and Fahrenheit degrees (*see* p. [78]). The following information respecting them is extracted from the introduction to the Tables (p. 4):—

"Table III.—This table gives the tension of saturated aqueous vapour, in decimals of an inch of mercury at the temperature 32°, in latitude 22°, at the level of the sea. It has been reduced from the original table for the latitude of Dublin, computed [from Regnault's observations] by the Rev. Robert V. Dixon, by correcting his values for the difference of gravity, viz., multiplying them by the constant factor 1·00286184.

"The psychrometric tables which follow are all based on this table, and the computation has been chiefly made by the aid of the arithmometer.

"August's formula [modified by Regnault], which has been used in computing the Tables IV. to XI., is as follows:—

"For temperatures of the wet bulb below 32°:

$$x = f' - \frac{{\cdot}480\,(t - t')}{1240{\cdot}2 - t'}\,h,$$

"and for temperatures of wet bulb above 32°:

$$x = f' - \frac{{\cdot}480\,(t - t')}{1130 - t'}\,h,$$

wherein t' and t are the temperatures of the dry-and-wet-bulb thermometers respectively, in Fahrenheit degrees, f' the tension of vapour at temperature t', h the reading of the barometer in inches, and x the tension of the vapour present in the air at the time of the observation."

Glaisher's tables are based upon Regnault's table of pressures, and the table of Greenwich factors, which the following extract from the introduction to Glaisher's tables (p. iv.) sufficiently describes. These are adapted for English inches and Fahrenheit scale of temperature:—

"*Determination of the Dew-point from observations of the Dry and Wet Bulb Thermometers.*

"Table I.—Factors by which it is necessary to multiply the excess of the reading of the dry thermometer over that of the wet, to give the excess of the temperature of the air above that of the dew-point, for every degree of air-temperature, from 10° to 100°.

"The numbers in this table have been found from the combination of many thousand simultaneous observations of the dry-and-wet-bulb thermometers and of Daniell's hygrometer, taken at the Royal Observatory, Greenwich, from the year 1841 to 1854, and from observations taken at high temperatures in India, and others at low and medium temperatures at Toronto. The results at the same temperatures were found to be alike at these different places; and therefore the factors may be considered as of general application.

"By means of the numbers in this table the temperatures of the dew-point in the general tables have been calculated; and these were for many years checked by direct observations with Daniell's Hygrometer made by me at the Royal Observatory, Greenwich."

Guyot's tables are a very complete set, comprising:—

i. Extended tables based upon Regnault's formulæ already given, adapted for millimetres and centigrade degrees.
ii. The same adapted for inches and Fahrenheit degrees. (These are given "for ordinary use.")
iii. Glaisher's table of Greenwich factors and an old set of Glaisher's psychrometrical tables, based upon them and a Greenwich table of pressures. (These are given for the purpose of "comparing results.")

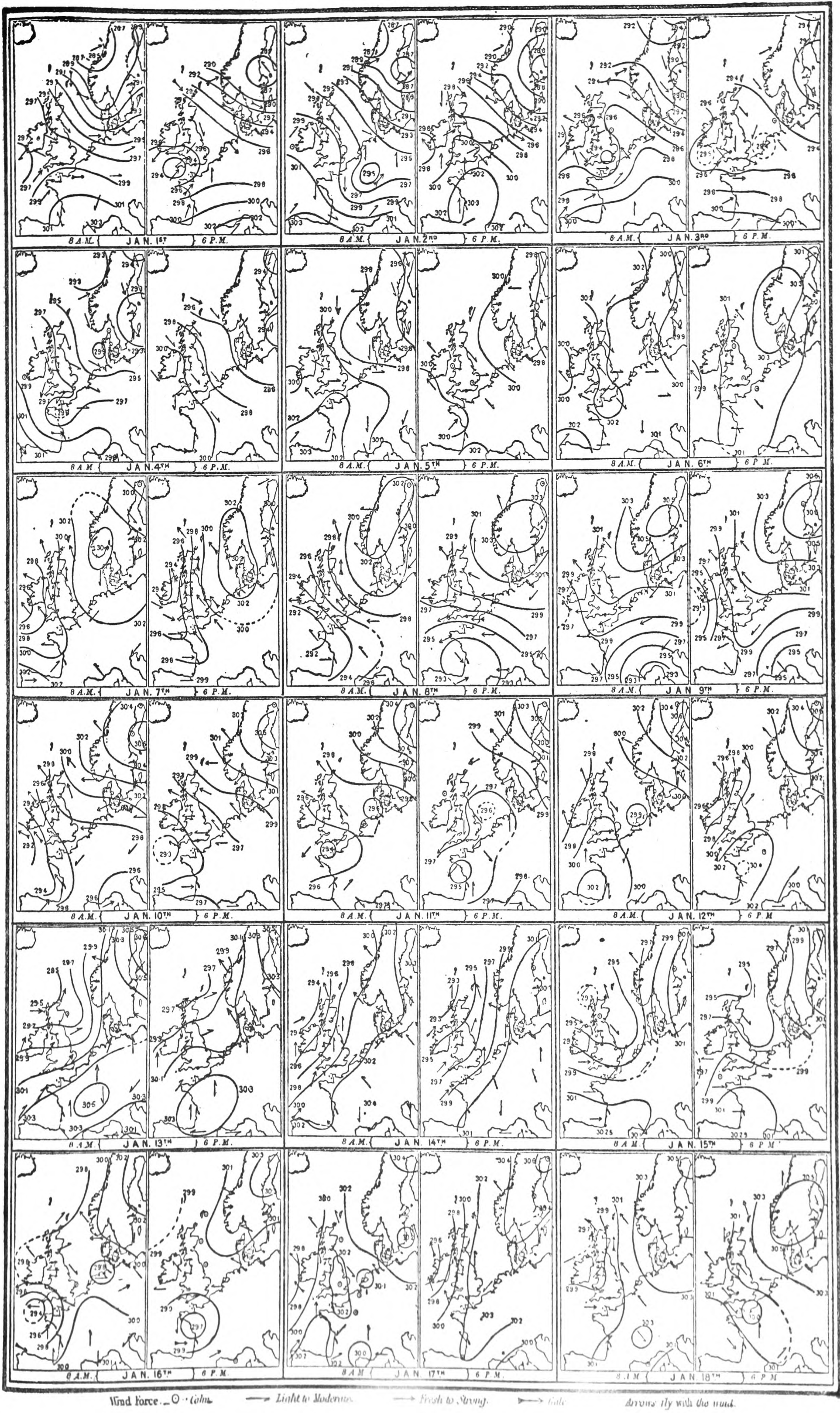
Besides these there are Angot's tables referred to on p. [78], but I am not aware that they are in general use in any country.

The information may be summarized in the following table:—

Country.	Tables.	Formula of Reduction.	Units.
England - - -	Glaisher - -	Greenwich factors -	Inches, Fahrenheit.
India - - -	Blanford - -	Regnault's formulæ -	" "
America - - -	Guyot - - -	" " -	Both.
France - - -	Haeghens - -	" " -	Millimetres, centigrade.
Italy - - -	Do. - - -	" " -	" "
Germany - -	Wild - - -	" " -	" "
Austria - - -	Jelinek - -	" " -	" "
Russia - - -	Wild - - -	" " -	" "

J A N U A R Y — 1879

Chart Plate 1.

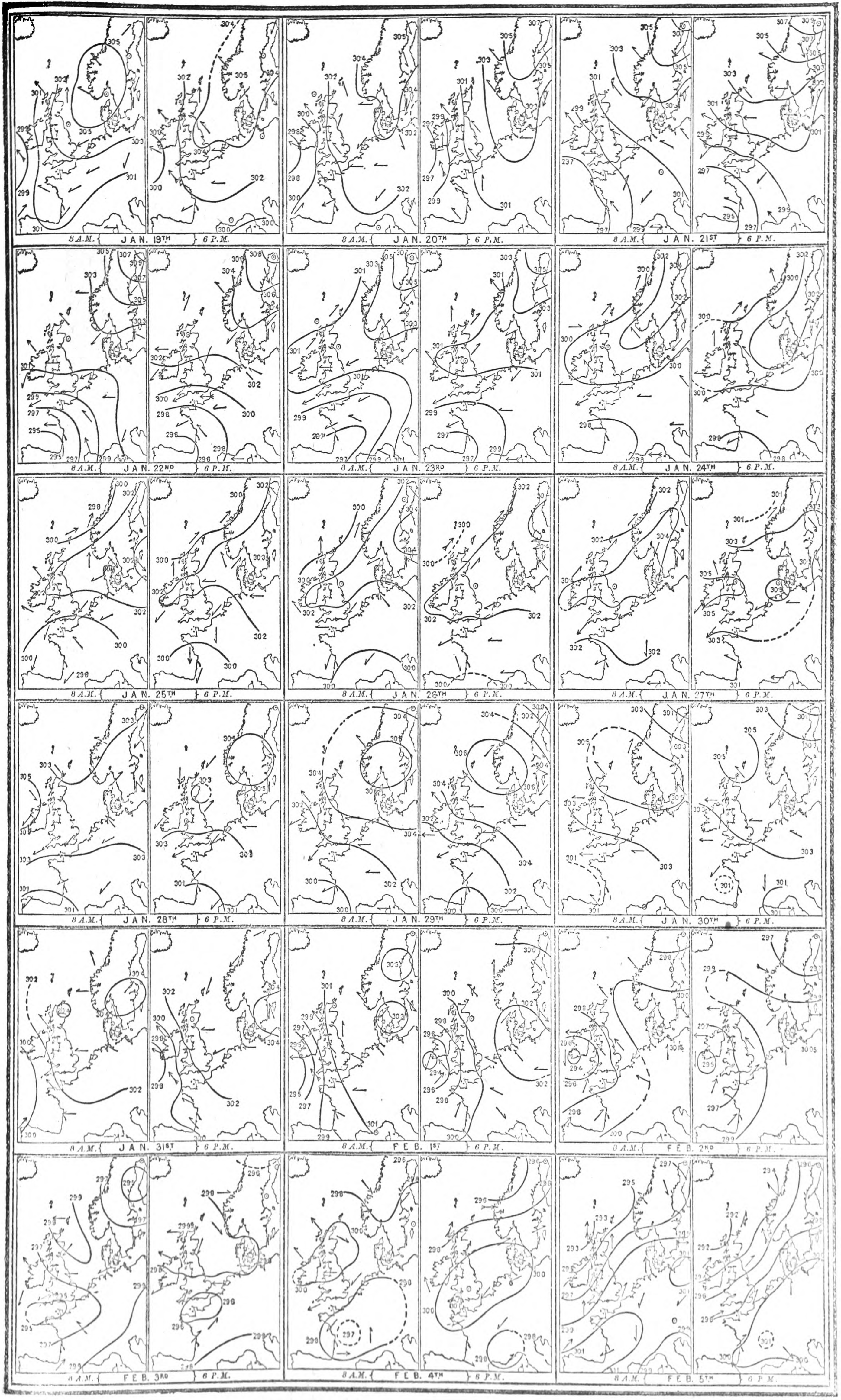


8 A.M. JAN. 1ST 6 P.M.
8 A.M. JAN. 2ND 6 P.M.
8 A.M. JAN. 3RD 6 P.M.
8 A.M. JAN. 4TH 6 P.M.
8 A.M. JAN. 5TH 6 P.M.
8 A.M. JAN. 6TH 6 P.M.
8 A.M. JAN. 7TH 6 P.M.
8 A.M. JAN. 8TH 6 P.M.
8 A.M. JAN. 9TH 6 P.M.
8 A.M. JAN. 10TH 6 P.M.
8 A.M. JAN. 11TH 6 P.M.
8 A.M. JAN. 12TH 6 P.M.
8 A.M. JAN. 13TH 6 P.M.
8 A.M. JAN. 14TH 6 P.M.
8 A.M. JAN. 15TH 6 P.M.
8 A.M. JAN. 16TH 6 P.M.
8 A.M. JAN. 17TH 6 P.M.
8 A.M. JAN. 18TH 6 P.M.

Wind Force _ ⊙ Calm → Light to Moderate → Fresh to Strong → Gale Arrows fly with the wind.

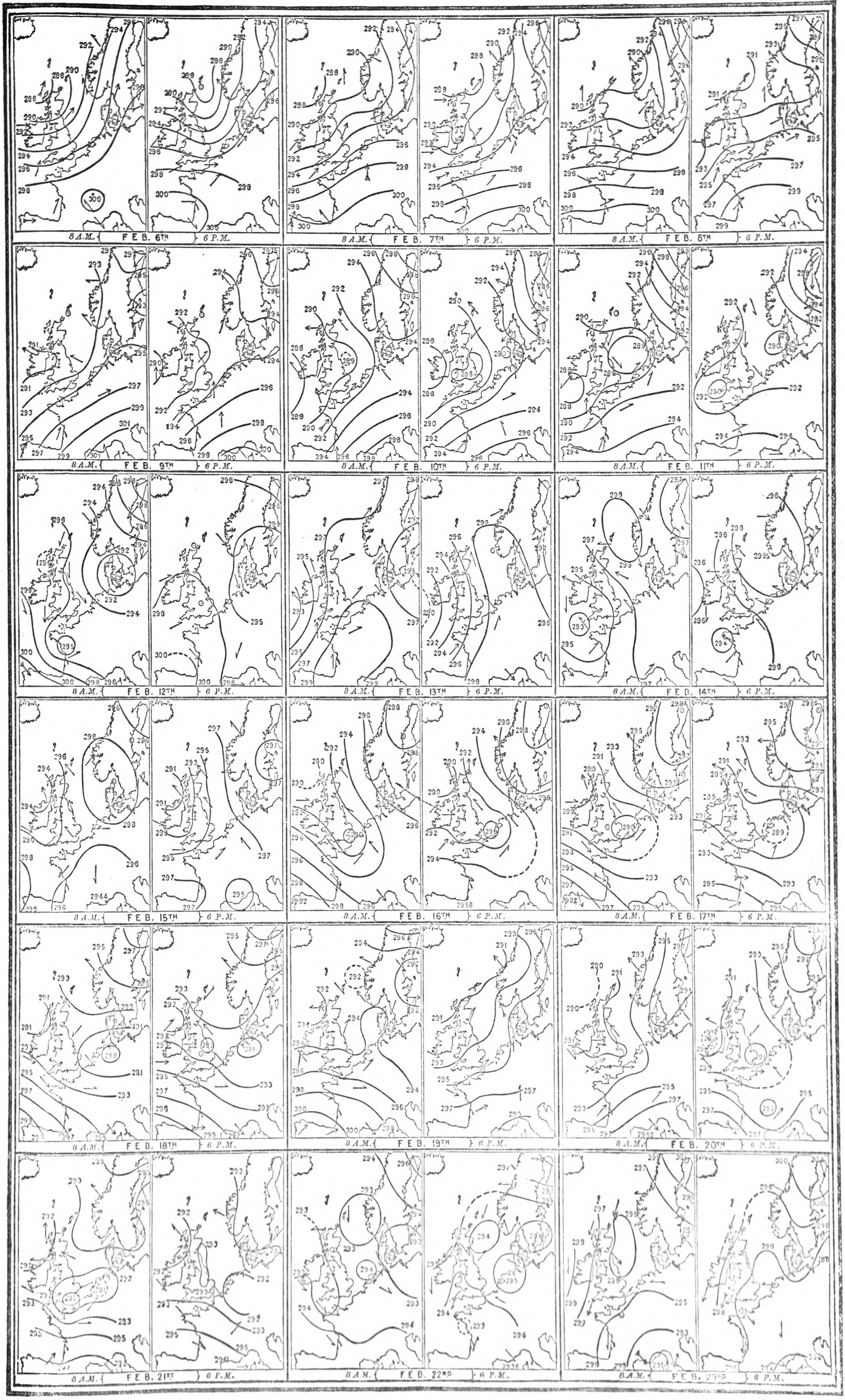
JANUARY & FEBRUARY 1879.

Chart-Plate 2.



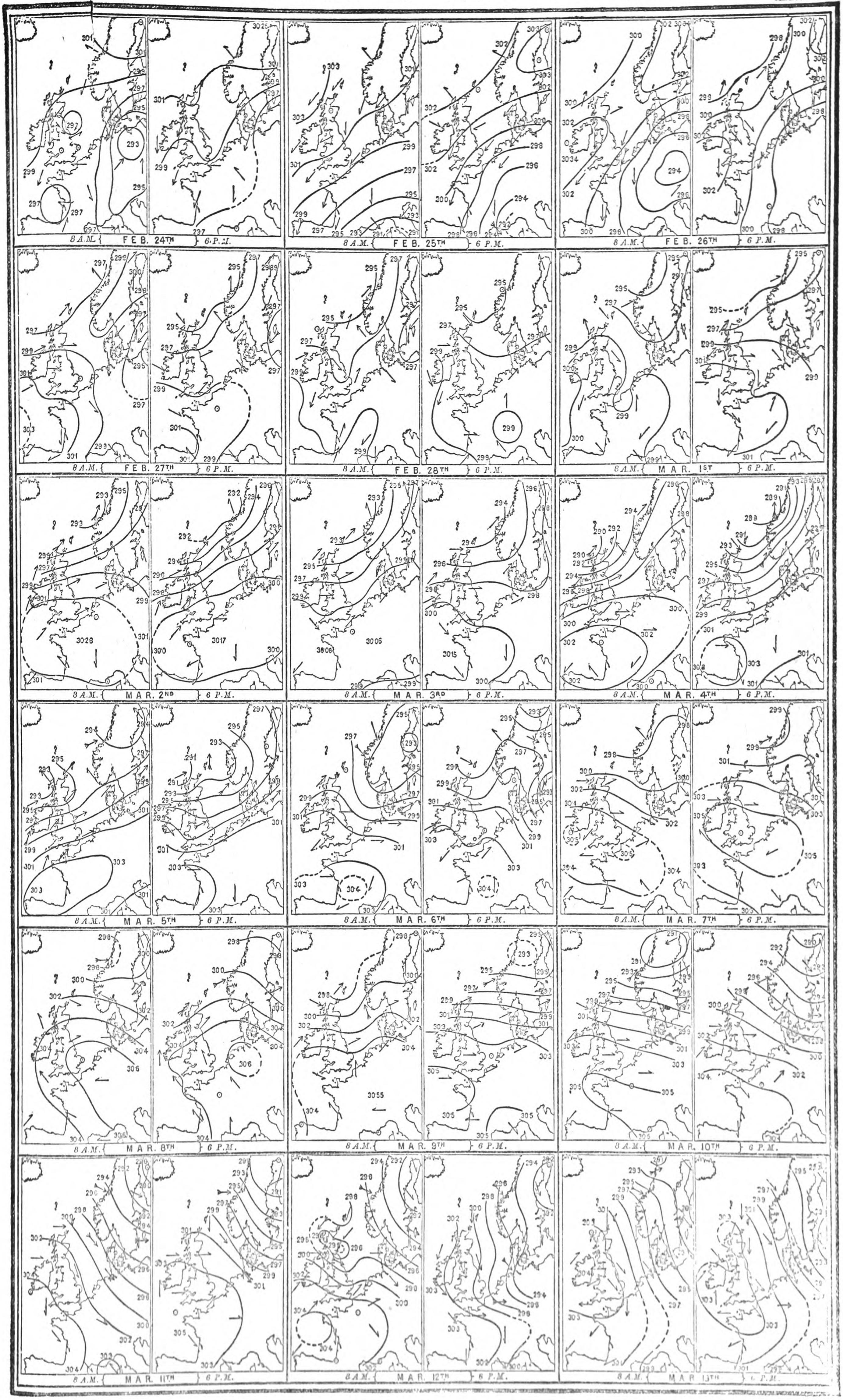
8 A.M. { JAN. 19TH } 6 P.M.
8 A.M. { JAN. 20TH } 6 P.M.
8 A.M. { JAN. 21ST } 6 P.M.
8 A.M. { JAN. 22ND } 6 P.M.
8 A.M. { JAN. 23RD } 6 P.M.
8 A.M. { JAN. 24TH } 6 P.M.
8 A.M. { JAN. 25TH } 6 P.M.
8 A.M. { JAN. 26TH } 6 P.M.
8 A.M. { JAN. 27TH } 6 P.M.
8 A.M. { JAN. 28TH } 6 P.M.
8 A.M. { JAN. 29TH } 6 P.M.
8 A.M. { JAN. 30TH } 6 P.M.
8 A.M. { JAN. 31ST } 6 P.M.
8 A.M. { FEB. 1ST } 6 P.M.
8 A.M. { FEB. 2ND } 6 P.M.
8 A.M. { FEB. 3RD } 6 P.M.
8 A.M. { FEB. 4TH } 6 P.M.
8 A.M. { FEB. 5TH } 6 P.M.

FEBRUARY — 1879.

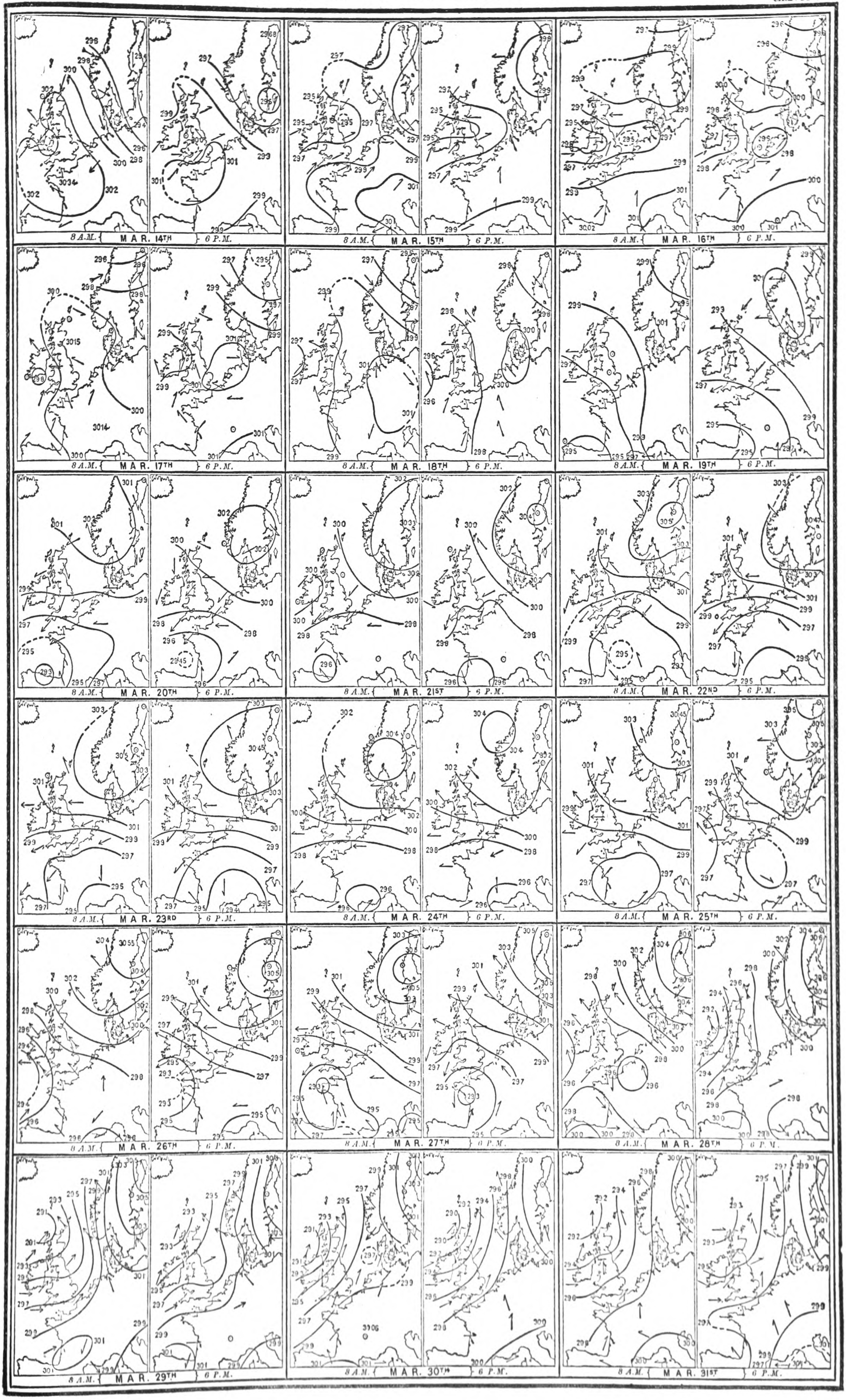

8 A.M. FEB. 6TH 6 P.M.
8 A.M. FEB. 7TH 6 P.M.
8 A.M. FEB. 8TH 6 P.M.
8 A.M. FEB. 9TH 6 P.M.
8 A.M. FEB. 10TH 6 P.M.
8 A.M. FEB. 11TH 6 P.M.
8 A.M. FEB. 12TH 6 P.M.
8 A.M. FEB. 13TH 6 P.M.
8 A.M. FEB. 14TH 6 P.M.
8 A.M. FEB. 15TH 6 P.M.
8 A.M. FEB. 16TH 6 P.M.
8 A.M. FEB. 17TH 6 P.M.
8 A.M. FEB. 18TH 6 P.M.
8 A.M. FEB. 19TH 6 P.M.
8 A.M. FEB. 20TH 6 P.M.
8 A.M. FEB. 21ST 6 P.M.
8 A.M. FEB. 22ND 6 P.M.
8 A.M. FEB. 23RD 6 P.M.

FEBRUARY & MARCH — 1879.

Chart-Plate 4

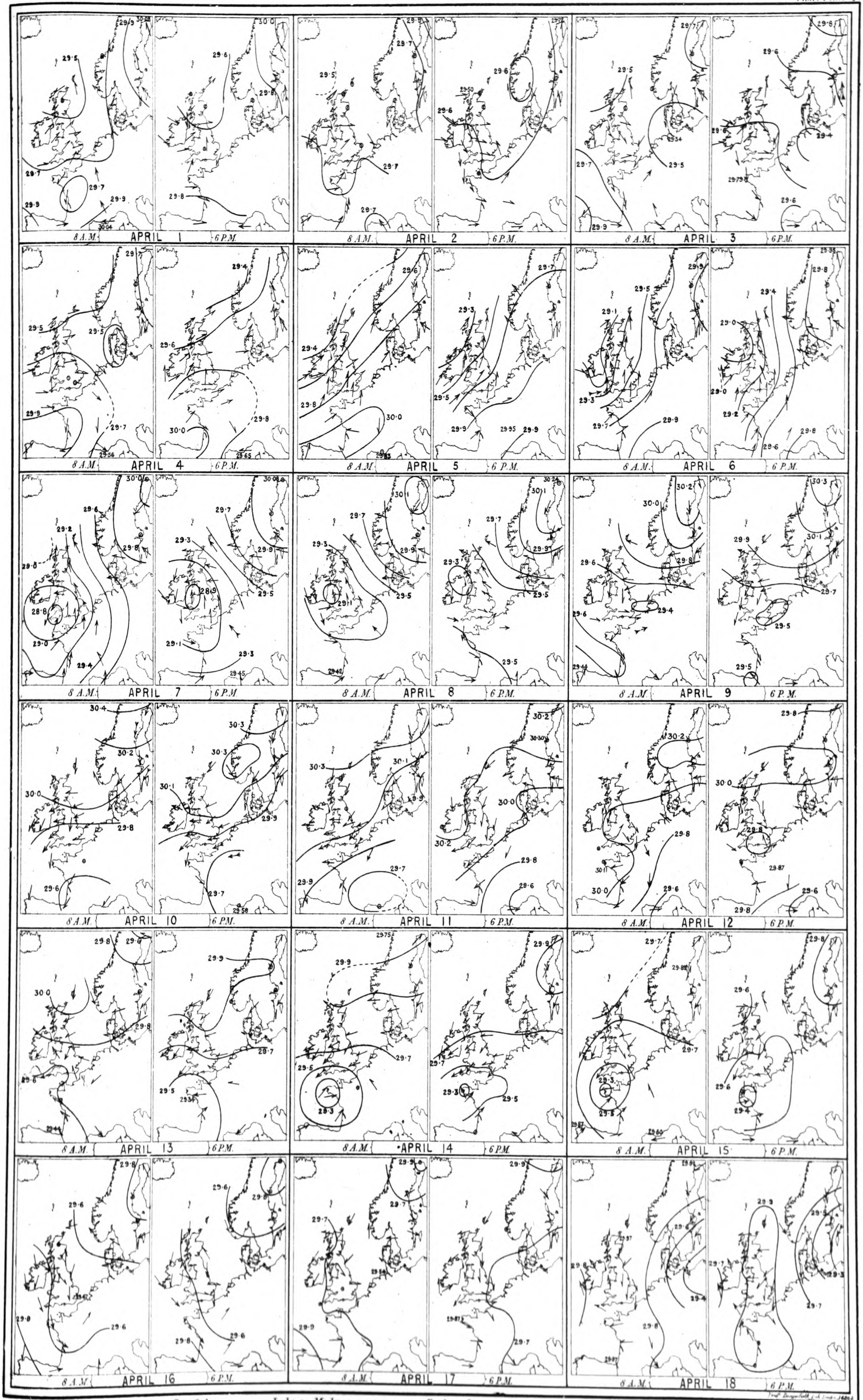

8 A.M. FEB. 24TH 6 P.M.
8 A.M. FEB. 25TH 6 P.M.
8 A.M. FEB. 26TH 6 P.M.
8 A.M. FEB. 27TH 6 P.M.
8 A.M. FEB. 28TH 6 P.M.
8 A.M. MAR. 1ST 6 P.M.
8 A.M. MAR. 2ND 6 P.M.
8 A.M. MAR. 3RD 6 P.M.
8 A.M. MAR. 4TH 6 P.M.
8 A.M. MAR. 5TH 6 P.M.
8 A.M. MAR. 6TH 6 P.M.
8 A.M. MAR. 7TH 6 P.M.
8 A.M. MAR. 8TH 6 P.M.
8 A.M. MAR. 9TH 6 P.M.
8 A.M. MAR. 10TH 6 P.M.
8 A.M. MAR. 11TH 6 P.M.
8 A.M. MAR. 12TH 6 P.M.
8 A.M. MAR. 13TH 6 P.M.

MARCH — 1879.


8 A.M. MAR. 14TH 6 P.M.
8 A.M. MAR. 15TH 6 P.M.
8 A.M. MAR. 16TH 6 P.M.
8 A.M. MAR. 17TH 6 P.M.
8 A.M. MAR. 18TH 6 P.M.
8 A.M. MAR. 19TH 6 P.M.
8 A.M. MAR. 20TH 6 P.M.
8 A.M. MAR. 21ST 6 P.M.
8 A.M. MAR. 22ND 6 P.M.
8 A.M. MAR. 23RD 6 P.M.
8 A.M. MAR. 24TH 6 P.M.
8 A.M. MAR. 25TH 6 P.M.
8 A.M. MAR. 26TH 6 P.M.
8 A.M. MAR. 27TH 6 P.M.
8 A.M. MAR. 28TH 6 P.M.
8 A.M. MAR. 29TH 6 P.M.
8 A.M. MAR. 30TH 6 P.M.
8 A.M. MAR. 31ST 6 P.M.

APRIL, 1879.

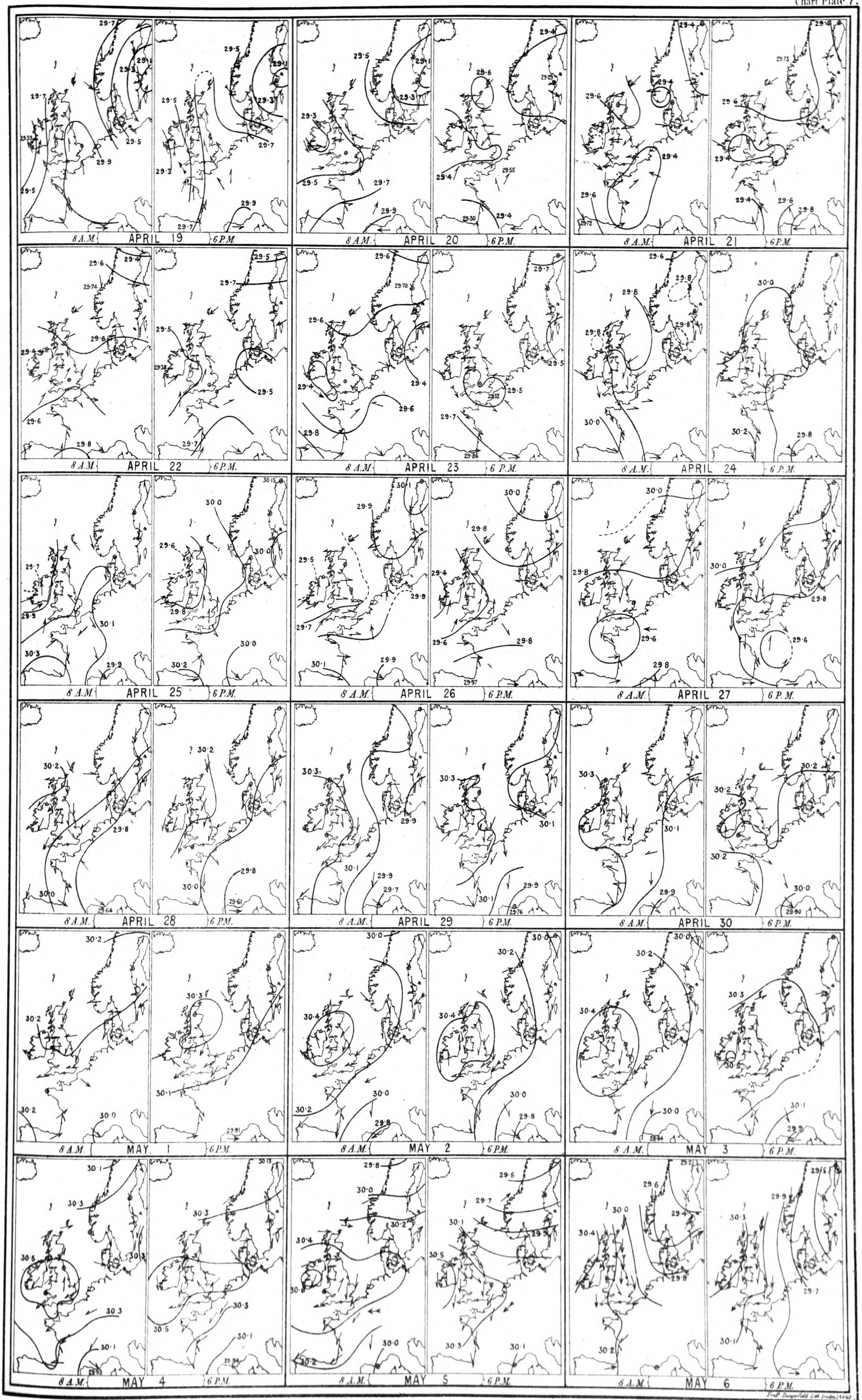
Chart Plate 6.


8 A.M. APRIL 1 6 P.M.
8 A.M. APRIL 2 6 P.M.
8 A.M. APRIL 3 6 P.M.
8 A.M. APRIL 4 6 P.M.
8 A.M. APRIL 5 6 P.M.
8 A.M. APRIL 6 6 P.M.
8 A.M. APRIL 7 6 P.M.
8 A.M. APRIL 8 6 P.M.
8 A.M. APRIL 9 6 P.M.
8 A.M. APRIL 10 6 P.M.
8 A.M. APRIL 11 6 P.M.
8 A.M. APRIL 12 6 P.M.
8 A.M. APRIL 13 6 P.M.
8 A.M. APRIL 14 6 P.M.
8 A.M. APRIL 15 6 P.M.
8 A.M. APRIL 16 6 P.M.
8 A.M. APRIL 17 6 P.M.
8 A.M. APRIL 18 6 P.M.

Wind Force— ⊙ – *Calm* ——→ *Light to Moderate.* ——→ *Fresh to Strong.* ——→ *Gale.* *Arrows fly with the Wind.*

APRIL & MAY, 1879.

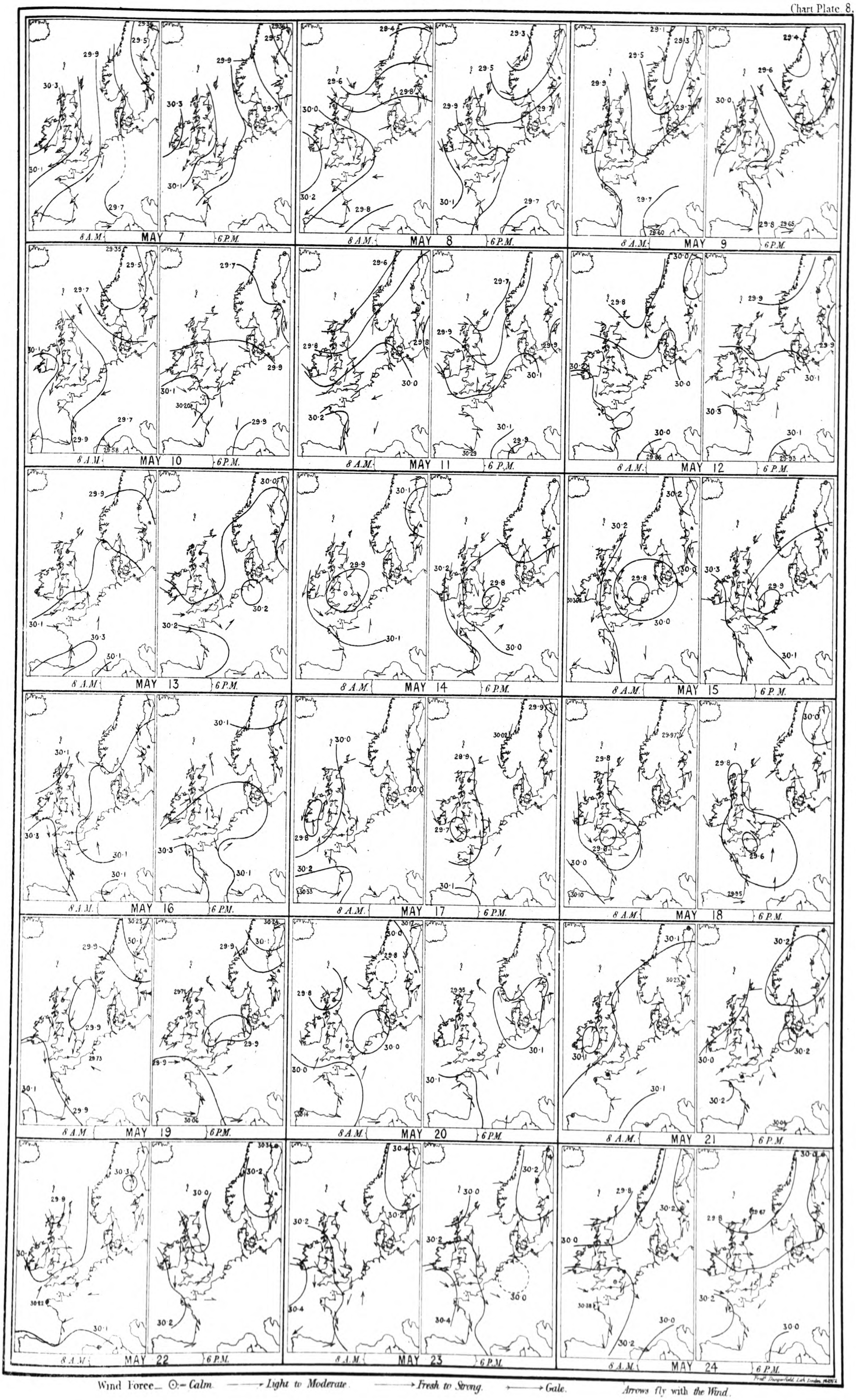
Chart Plate 7.


8 A.M. APRIL 19 6 P.M.
8 A.M. APRIL 20 6 P.M.
8 A.M. APRIL 21 6 P.M.
8 A.M. APRIL 22 6 P.M.
8 A.M. APRIL 23 6 P.M.
8 A.M. APRIL 24 6 P.M.
8 A.M. APRIL 25 6 P.M.
8 A.M. APRIL 26 6 P.M.
8 A.M. APRIL 27 6 P.M.
8 A.M. APRIL 28 6 P.M.
8 A.M. APRIL 29 6 P.M.
8 A.M. APRIL 30 6 P.M.
8 A.M. MAY 1 6 P.M.
8 A.M. MAY 2 6 P.M.
8 A.M. MAY 3 6 P.M.
8 A.M. MAY 4 6 P.M.
8 A.M. MAY 5 6 P.M.
8 A.M. MAY 6 6 P.M.

Wind Force — ⊙ – Calm ⟶ Light to Moderate. ⟶ Fresh to Strong. ⟶ Gale. Arrows fly with the Wind.

MAY, 1879.

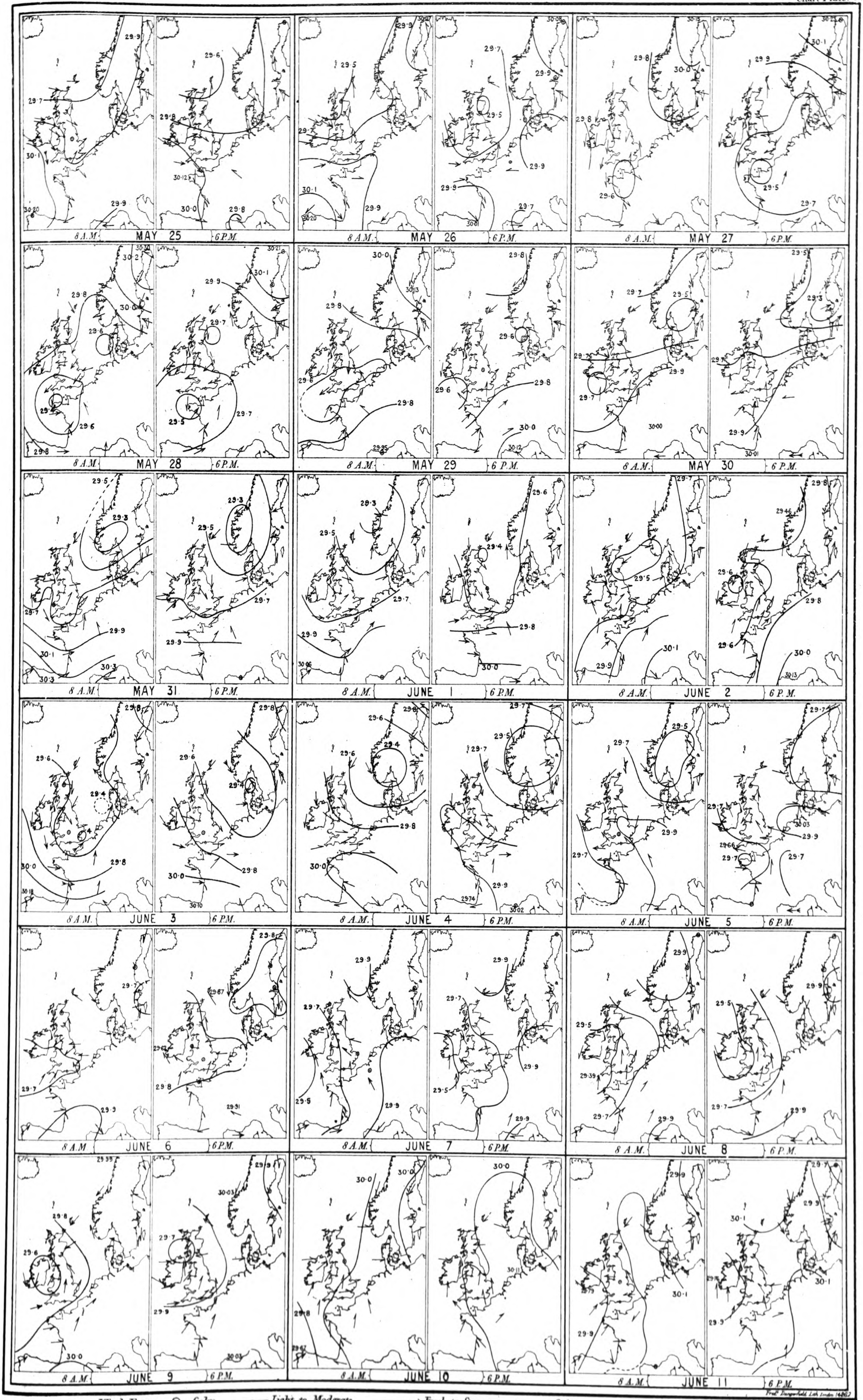
Chart Plate 8.


8 A.M. MAY 7 6 P.M.
8 A.M. MAY 8 6 P.M.
8 A.M. MAY 9 6 P.M.
8 A.M. MAY 10 6 P.M.
8 A.M. MAY 11 6 P.M.
8 A.M. MAY 12 6 P.M.
8 A.M. MAY 13 6 P.M.
8 A.M. MAY 14 6 P.M.
8 A.M. MAY 15 6 P.M.
8 A.M. MAY 16 6 P.M.
8 A.M. MAY 17 6 P.M.
8 A.M. MAY 18 6 P.M.
8 A.M. MAY 19 6 P.M.
8 A.M. MAY 20 6 P.M.
8 A.M. MAY 21 6 P.M.
8 A.M. MAY 22 6 P.M.
8 A.M. MAY 23 6 P.M.
8 A.M. MAY 24 6 P.M.
Fredk Dangerfield, Lith. London, [illegible]

Wind Force_ ⊙:- Calm. ——→ Light to Moderate. ——→ Fresh to Strong. ——→ Gale. Arrows fly with the Wind.

MAY & JUNE, 1879.

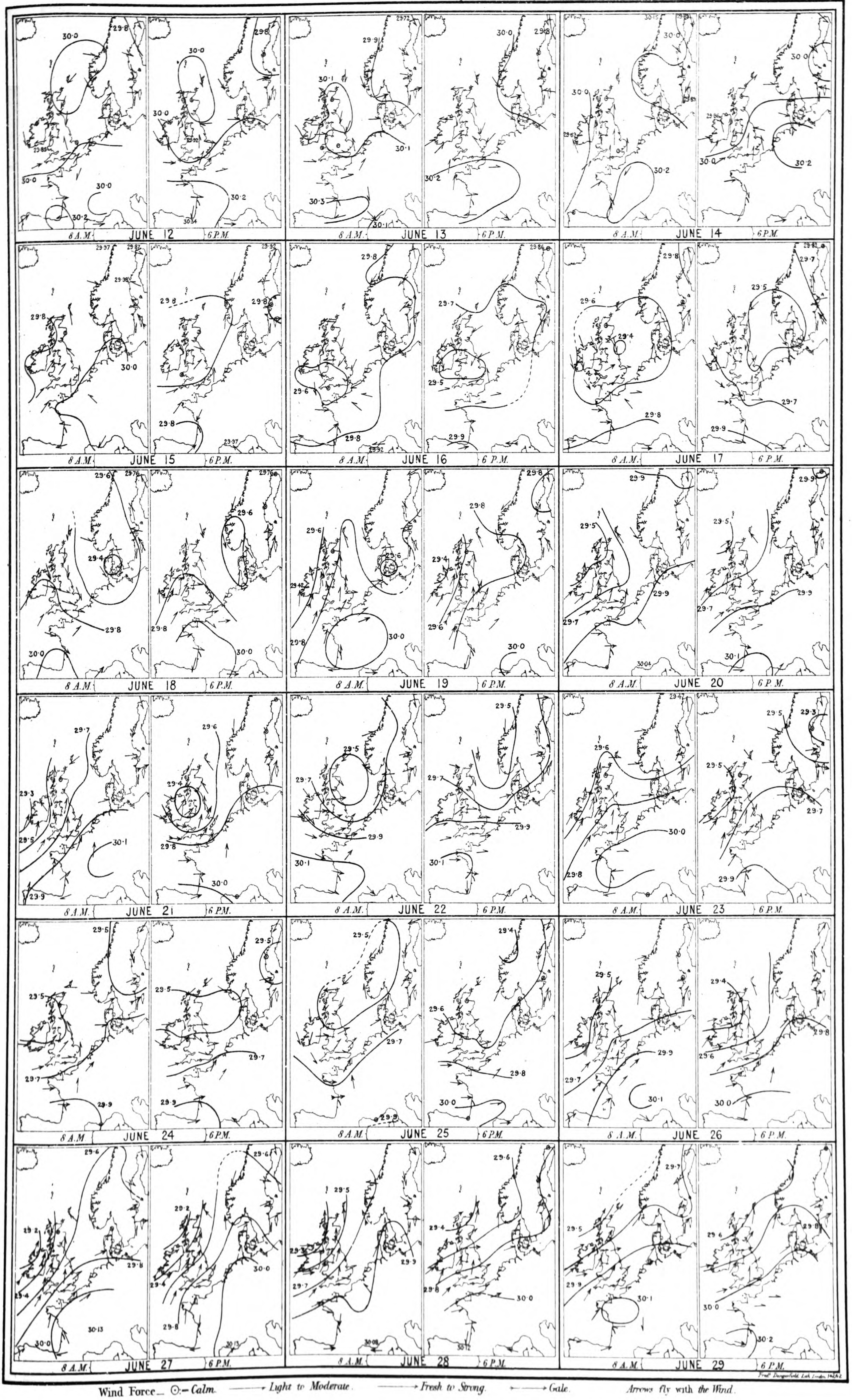
Chart Plate. 9.


8 A.M.
MAY 25
6 P.M.
8 A.M.
MAY 26
6 P.M.
8 A.M.
MAY 27
6 P.M.
8 A.M.
MAY 28
6 P.M.
8 A.M.
MAY 29
6 P.M.
8 A.M.
MAY 30
6 P.M.
8 A.M.
MAY 31
6 P.M.
8 A.M.
JUNE 1
6 P.M.
8 A.M.
JUNE 2
6 P.M.
8 A.M.
JUNE 3
6 P.M.
8 A.M.
JUNE 4
6 P.M.
8 A.M.
JUNE 5
6 P.M.
8 A.M.
JUNE 6
6 P.M.
8 A.M.
JUNE 7
6 P.M.
8 A.M.
JUNE 8
6 P.M.
8 A.M.
JUNE 9
6 P.M.
8 A.M.
JUNE 10
6 P.M.
8 A.M.
JUNE 11
6 P.M.
Fredk Dangerfield, Lith. London (4262)

Wind Force — ⊙ — *Calm.* ——→ *Light to Moderate.* ——→ *Fresh to Strong.* +——→ *Gale.* *Arrows fly with the Wind.*

JUNE, 1879.

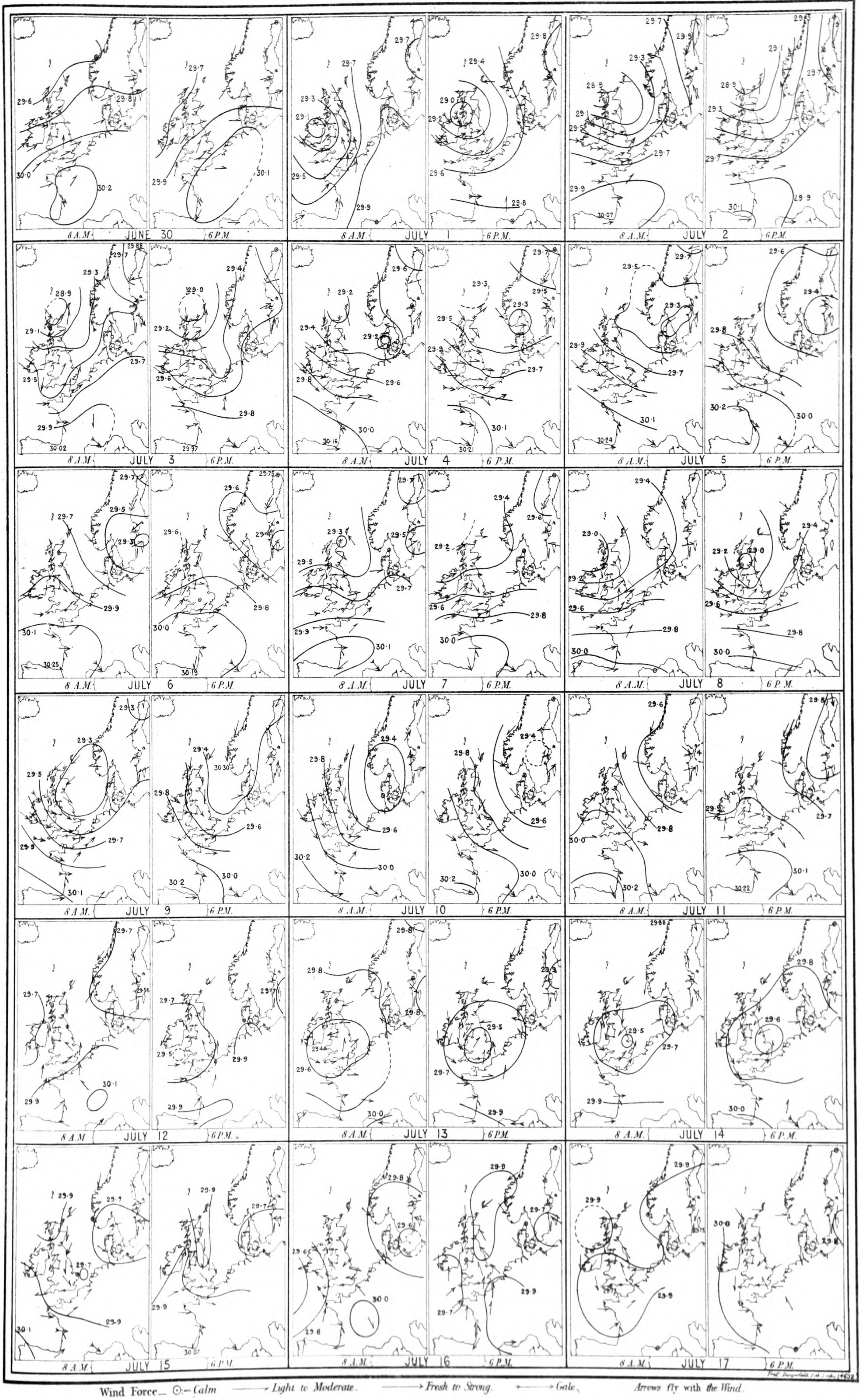
Chart Plate. 10.


8 A.M. JUNE 12 6 P.M.
30·0
29·8
29·85
30·0
30·2
30·0
29·92
30·34
8 A.M. JUNE 13 6 P.M.
29·72
29·9
30·1
30·3
30·2
8 A.M. JUNE 14 6 P.M.
30·15
29·83
29·63
29·86
30·2
8 A.M. JUNE 15 6 P.M.
29·97
29·87
29·93
29·8
30·0
29·92
29·97
8 A.M. JUNE 16 6 P.M.
29·8
29·6
29·92
29·86
29·7
29·5
29·9
8 A.M. JUNE 17 6 P.M.
29·6
29·4
29·83
29·7
29·5
8 A.M. JUNE 18 6 P.M.
29·76
29·4
30·0
8 A.M. JUNE 19 6 P.M.
29·42
8 A.M. JUNE 20 6 P.M.
30·04
30·1
8 A.M. JUNE 21 6 P.M.
29·3
8 A.M. JUNE 22 6 P.M.
8 A.M. JUNE 23 6 P.M.
29·47
8 A.M. JUNE 24 6 P.M.
8 A.M. JUNE 25 6 P.M.
8 A.M. JUNE 26 6 P.M.
8 A.M. JUNE 27 6 P.M.
29·2
30·13
8 A.M. JUNE 28 6 P.M.
30·08
30·12
8 A.M. JUNE 29 6 P.M.

Fred^k Dangerfield, Lith. London.

Wind Force_ ⊙:- Calm. ⟶ Light to Moderate. ⟶ Fresh to Strong. ⟶ Gale. Arrows fly with the Wind.

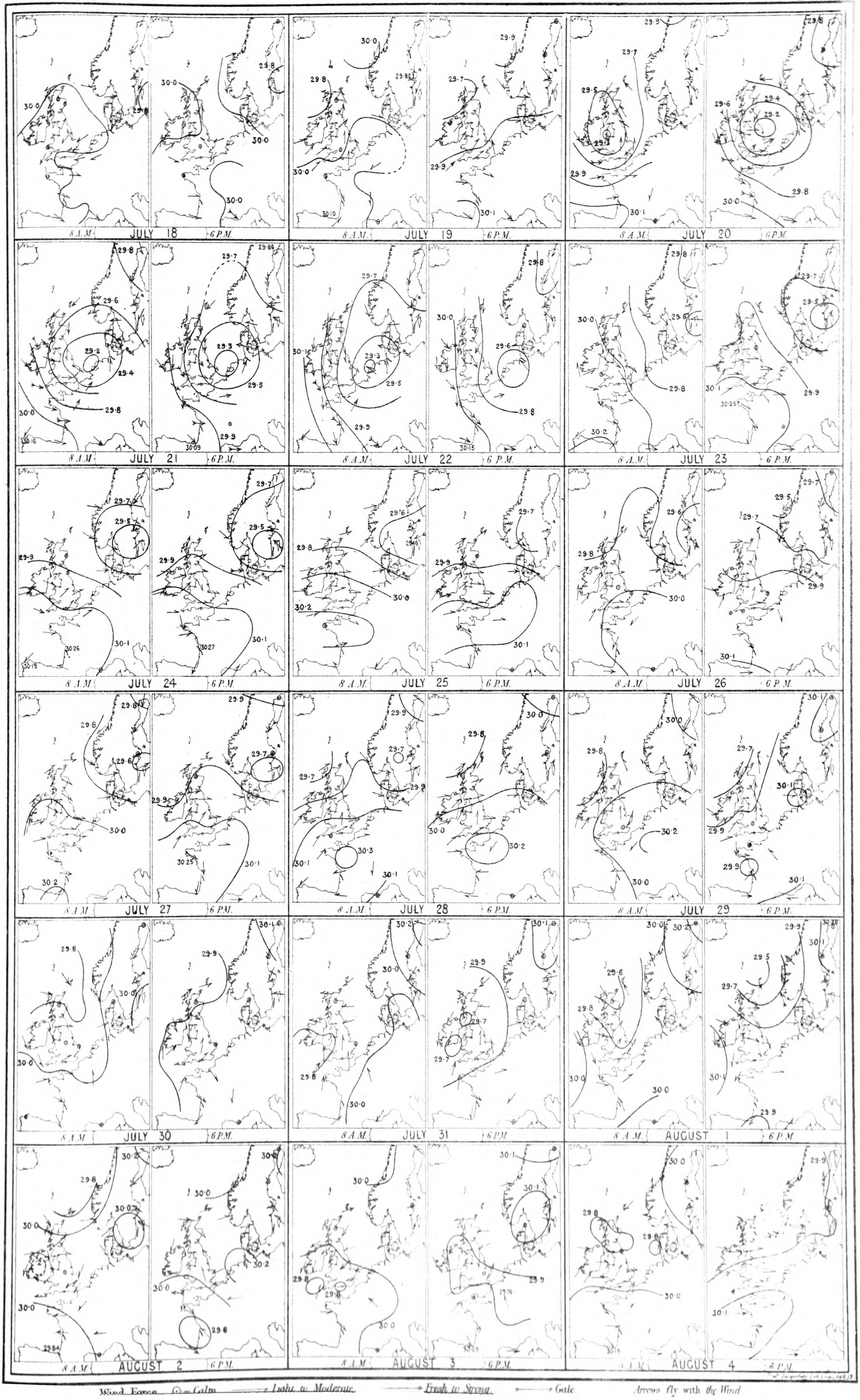
JUNE & JULY, 1879.


8 A.M. JUNE 30 6 P.M.
8 A.M. JULY 1 6 P.M.
8 A.M. JULY 2 6 P.M.
8 A.M. JULY 3 6 P.M.
8 A.M. JULY 4 6 P.M.
8 A.M. JULY 5 6 P.M.
8 A.M. JULY 6 6 P.M.
8 A.M. JULY 7 6 P.M.
8 A.M. JULY 8 6 P.M.
8 A.M. JULY 9 6 P.M.
8 A.M. JULY 10 6 P.M.
8 A.M. JULY 11 6 P.M.
8 A.M. JULY 12 6 P.M.
8 A.M. JULY 13 6 P.M.
8 A.M. JULY 14 6 P.M.
8 A.M. JULY 15 6 P.M.
8 A.M. JULY 16 6 P.M.
8 A.M. JULY 17 6 P.M.

Wind Force— ⊙—*Calm* ——→ *Light to Moderate.* ——→ *Fresh to Strong.* ——→ *Gale.* *Arrows fly with the Wind.*

JULY & AUGUST, 1879.

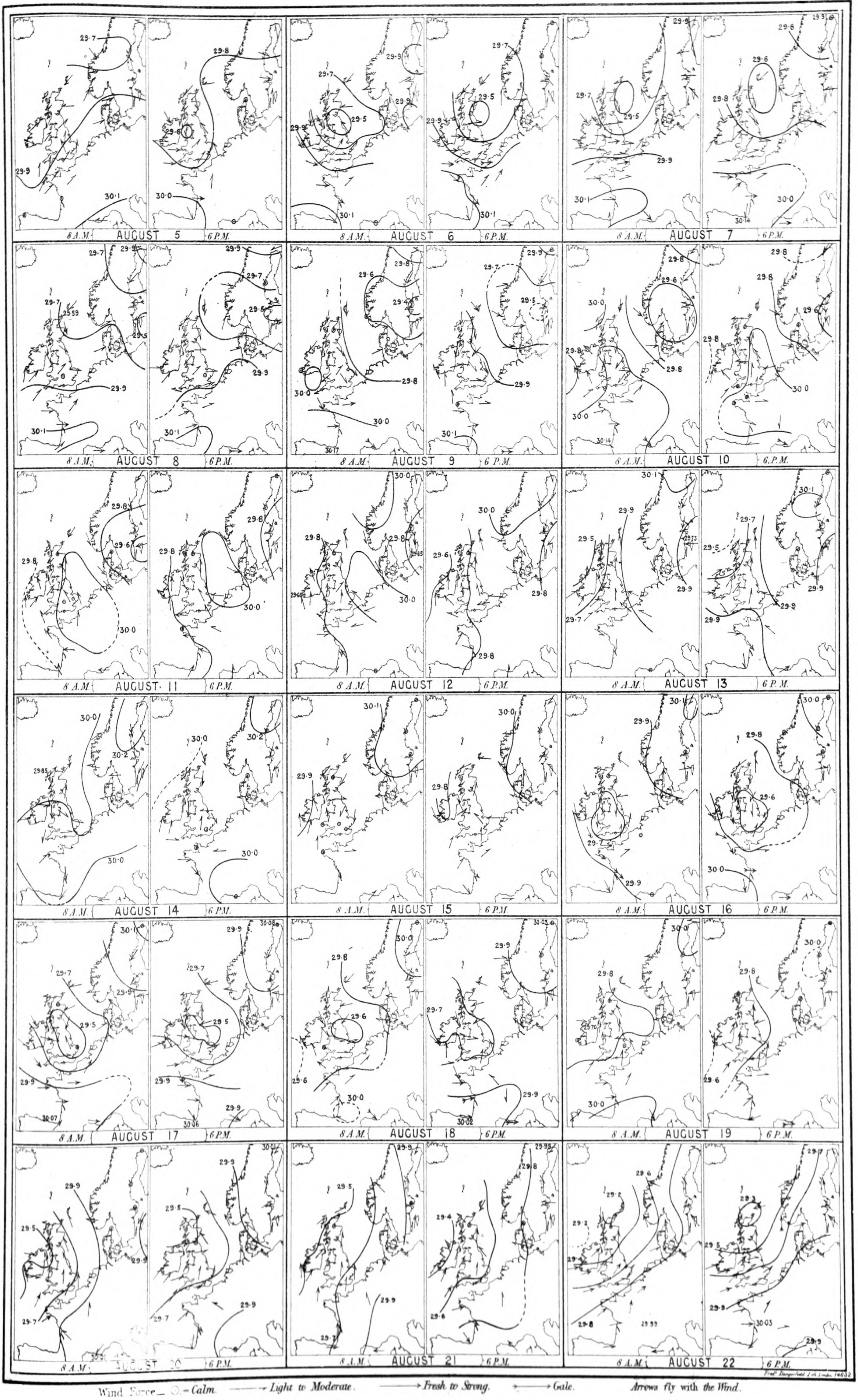
Chart Plate 12


8 A.M. JULY 18 6 P.M.
8 A.M. JULY 19 6 P.M.
8 A.M. JULY 20 6 P.M.
8 A.M. JULY 21 6 P.M.
8 A.M. JULY 22 6 P.M.
8 A.M. JULY 23 6 P.M.
8 A.M. JULY 24 6 P.M.
8 A.M. JULY 25 6 P.M.
8 A.M. JULY 26 6 P.M.
8 A.M. JULY 27 6 P.M.
8 A.M. JULY 28 6 P.M.
8 A.M. JULY 29 6 P.M.
8 A.M. JULY 30 6 P.M.
8 A.M. JULY 31 6 P.M.
8 A.M. AUGUST 1 6 P.M.
8 A.M. AUGUST 2 6 P.M.
8 A.M. AUGUST 3 6 P.M.
8 A.M. AUGUST 4 6 P.M.

Wind Force ⊙ = Calm → Light to Moderate → Fresh to Strong → Gale. Arrows fly with the Wind

AUGUST, 1879.

Chart Plate 13

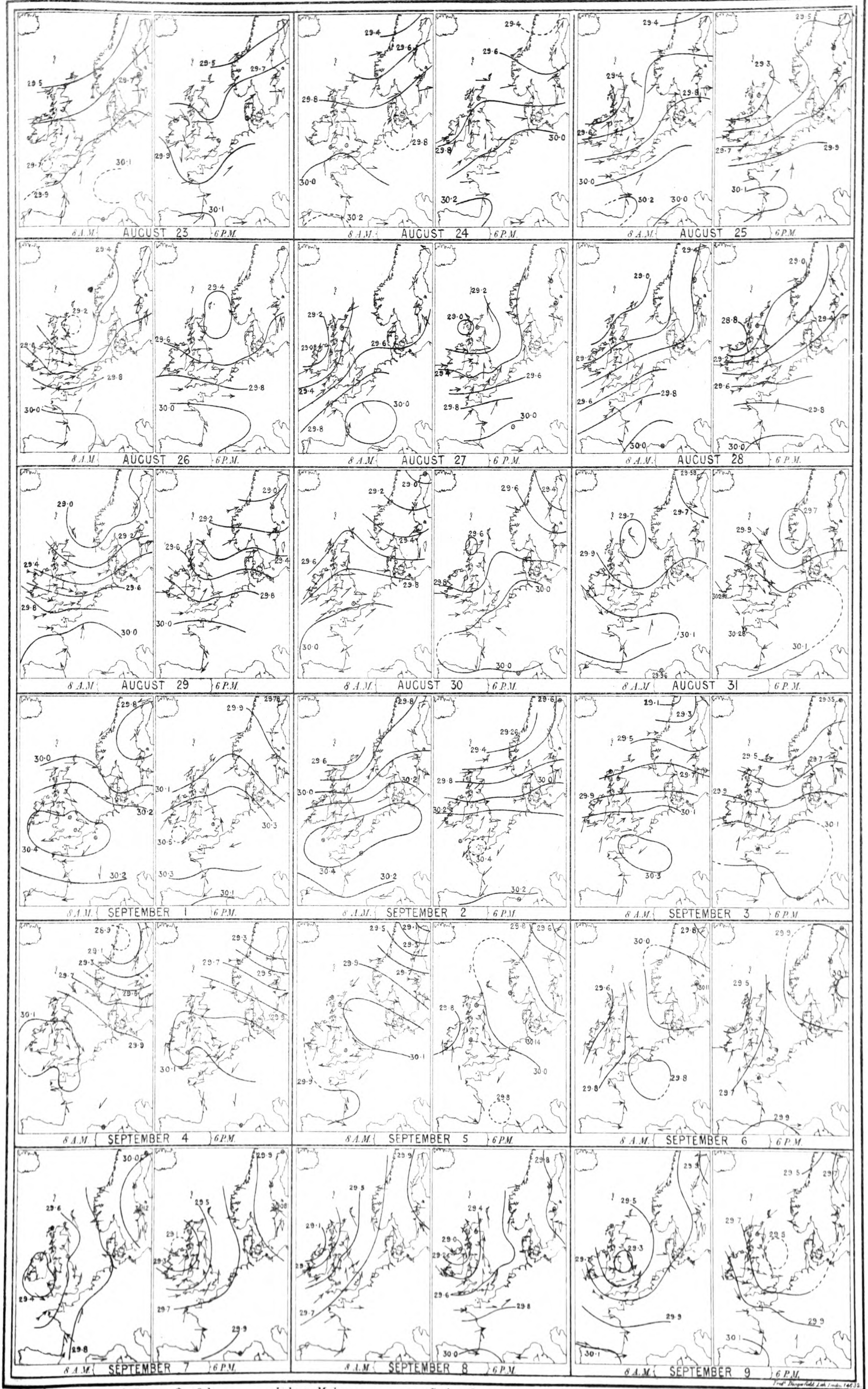

8 A.M.
AUGUST 5
6 P.M.
8 A.M.
AUGUST 6
6 P.M.
8 A.M.
AUGUST 7
6 P.M.
8 A.M.
AUGUST 8
6 P.M.
8 A.M.
AUGUST 9
6 P.M.
8 A.M.
AUGUST 10
6 P.M.
8 A.M.
AUGUST 11
6 P.M.
8 A.M.
AUGUST 12
6 P.M.
8 A.M.
AUGUST 13
6 P.M.
8 A.M.
AUGUST 14
6 P.M.
8 A.M.
AUGUST 15
6 P.M.
8 A.M.
AUGUST 16
6 P.M.
8 A.M.
AUGUST 17
6 P.M.
8 A.M.
AUGUST 18
6 P.M.
8 A.M.
AUGUST 19
6 P.M.
8 A.M.
AUGUST 20
6 P.M.
8 A.M.
AUGUST 21
6 P.M.
8 A.M.
AUGUST 22
6 P.M.

Fredk Dangerfield Lith London 14632

Wind Force — ⊙ — Calm. ——→ Light to Moderate. ——→ Fresh to Strong. ——→ Gale. Arrows fly with the Wind.

AUGUST & SEPTEMBER, 1879.

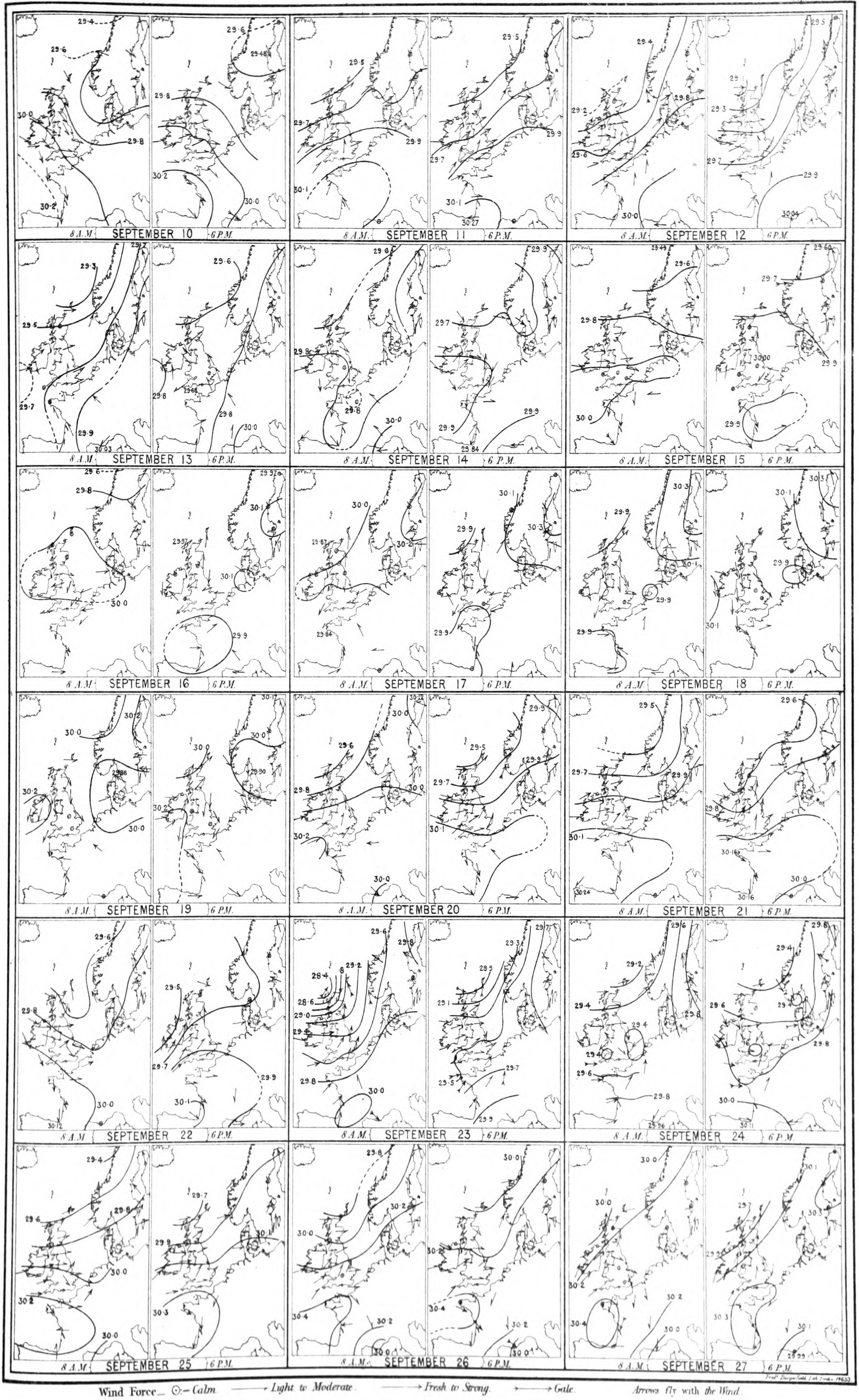
Chart Plate 14.


8 A.M. AUGUST 23 6 P.M.
8 A.M. AUGUST 24 6 P.M.
8 A.M. AUGUST 25 6 P.M.
8 A.M. AUGUST 26 6 P.M.
8 A.M. AUGUST 27 6 P.M.
8 A.M. AUGUST 28 6 P.M.
8 A.M. AUGUST 29 6 P.M.
8 A.M. AUGUST 30 6 P.M.
8 A.M. AUGUST 31 6 P.M.
8 A.M. SEPTEMBER 1 6 P.M.
8 A.M. SEPTEMBER 2 6 P.M.
8 A.M. SEPTEMBER 3 6 P.M.
8 A.M. SEPTEMBER 4 6 P.M.
8 A.M. SEPTEMBER 5 6 P.M.
8 A.M. SEPTEMBER 6 6 P.M.
8 A.M. SEPTEMBER 7 6 P.M.
8 A.M. SEPTEMBER 8 6 P.M.
8 A.M. SEPTEMBER 9 6 P.M.

Fredk Dangerfield Lith. London 14632.

Wind Force — ⊙ – *Calm* ——→ *Light to Moderate* ——→ *Fresh to Strong* ——→ *Gale* *Arrows fly with the Wind.*

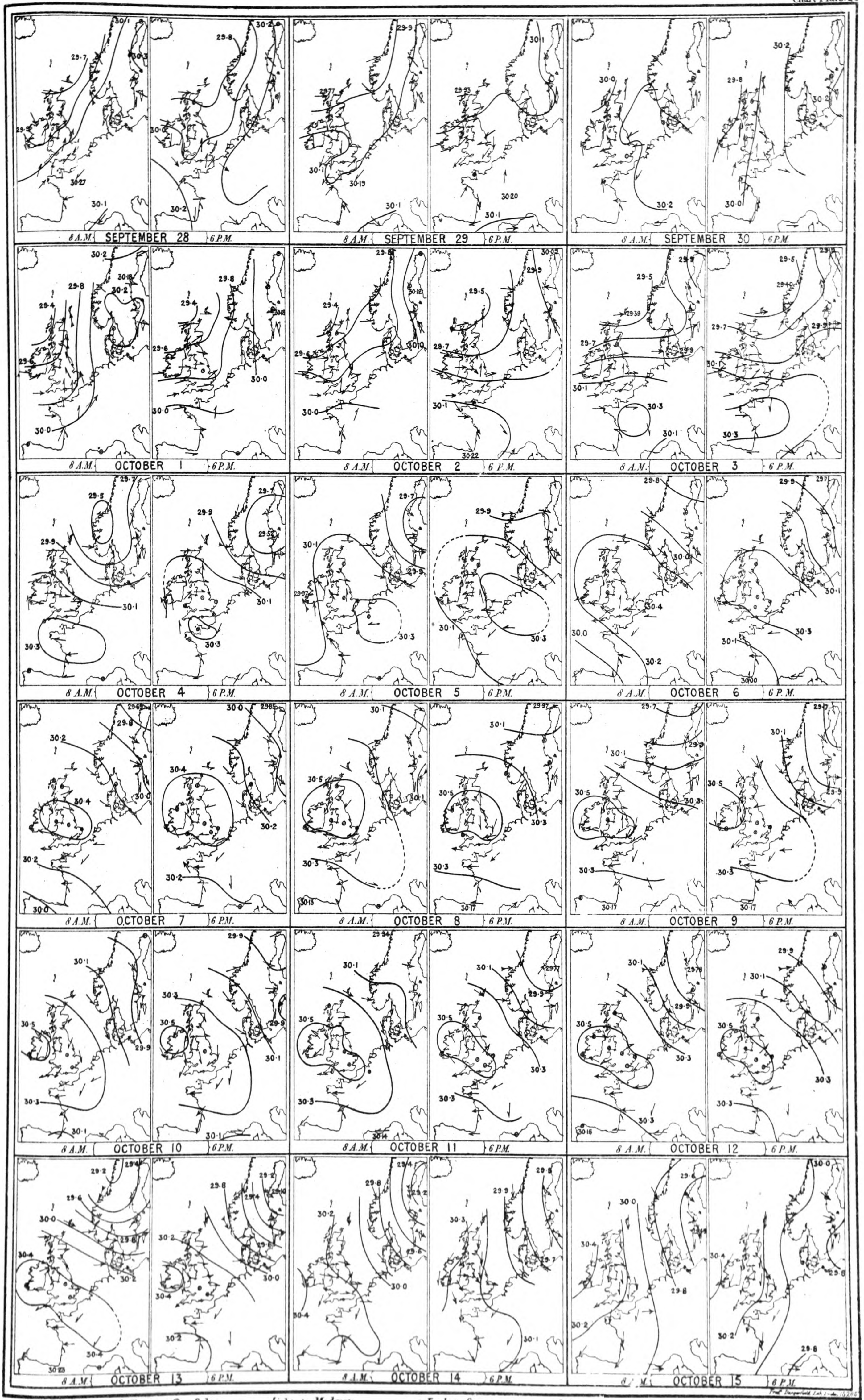
SEPTEMBER, 1879.


8 A.M. SEPTEMBER 10 6 P.M.
8 A.M. SEPTEMBER 11 6 P.M.
8 A.M. SEPTEMBER 12 6 P.M.
8 A.M. SEPTEMBER 13 6 P.M.
8 A.M. SEPTEMBER 14 6 P.M.
8 A.M. SEPTEMBER 15 6 P.M.
8 A.M. SEPTEMBER 16 6 P.M.
8 A.M. SEPTEMBER 17 6 P.M.
8 A.M. SEPTEMBER 18 6 P.M.
8 A.M. SEPTEMBER 19 6 P.M.
8 A.M. SEPTEMBER 20 6 P.M.
8 A.M. SEPTEMBER 21 6 P.M.
8 A.M. SEPTEMBER 22 6 P.M.
8 A.M. SEPTEMBER 23 6 P.M.
8 A.M. SEPTEMBER 24 6 P.M.
8 A.M. SEPTEMBER 25 6 P.M.
8 A.M. SEPTEMBER 26 6 P.M.
8 A.M. SEPTEMBER 27 6 P.M.
Fred^k Dangerfield Lith London 14633

Wind Force — ⊙ — *Calm.* ——→ *Light to Moderate.* ——→ *Fresh to Strong.* ——→ *Gale.* *Arrows fly with the Wind.*

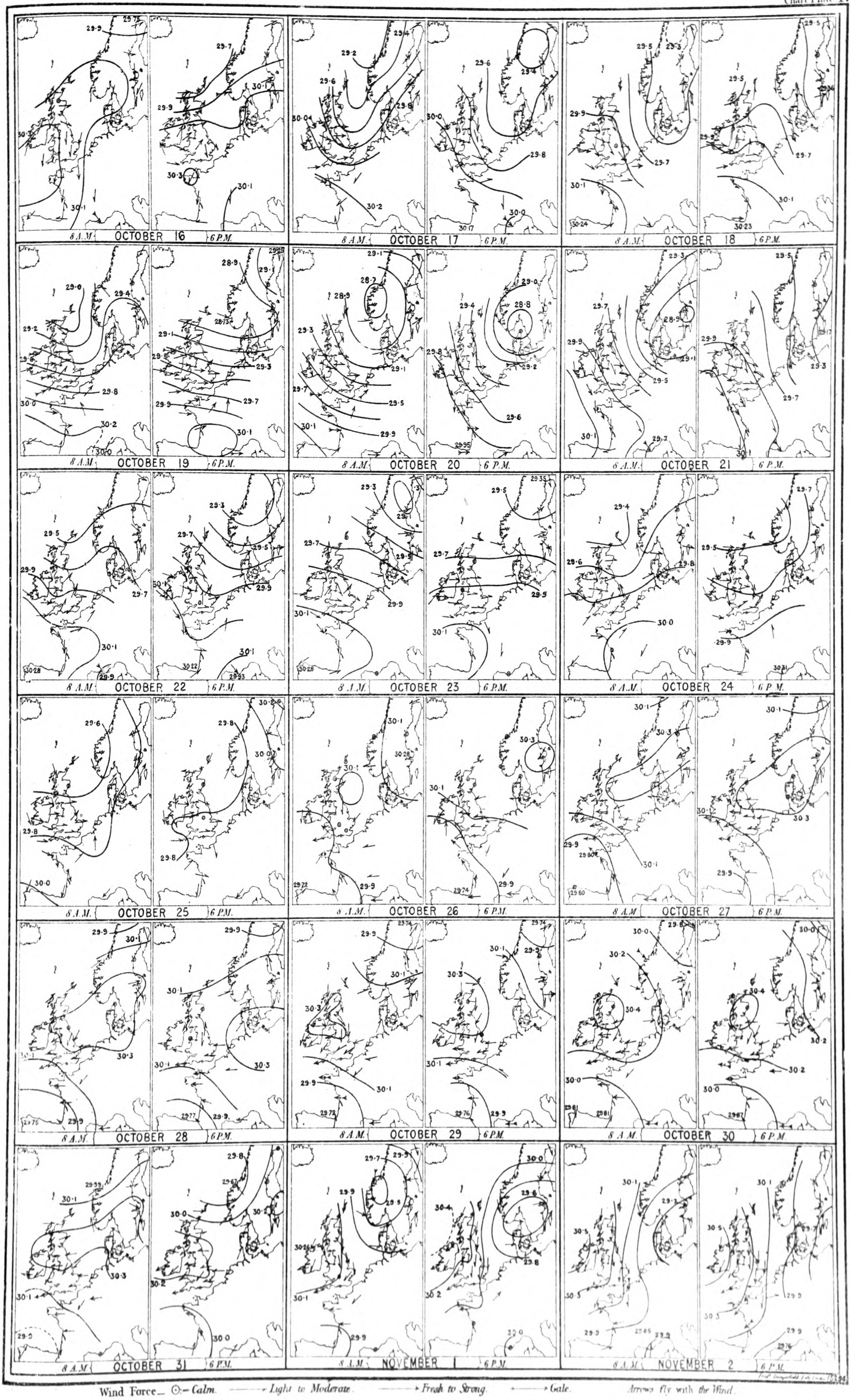
SEPTEMBER & OCTOBER, 1879.

Chart Plate 16


8 A.M. SEPTEMBER 28 6 P.M.
8 A.M. SEPTEMBER 29 6 P.M.
8 A.M. SEPTEMBER 30 6 P.M.
8 A.M. OCTOBER 1 6 P.M.
8 A.M. OCTOBER 2 6 P.M.
8 A.M. OCTOBER 3 6 P.M.
8 A.M. OCTOBER 4 6 P.M.
8 A.M. OCTOBER 5 6 P.M.
8 A.M. OCTOBER 6 6 P.M.
8 A.M. OCTOBER 7 6 P.M.
8 A.M. OCTOBER 8 6 P.M.
8 A.M. OCTOBER 9 6 P.M.
8 A.M. OCTOBER 10 6 P.M.
8 A.M. OCTOBER 11 6 P.M.
8 A.M. OCTOBER 12 6 P.M.
8 A.M. OCTOBER 13 6 P.M.
8 A.M. OCTOBER 14 6 P.M.
8 A.M. OCTOBER 15 6 P.M.

Wind Force — ⊙ — *Calm.* ⟶ *Light to Moderate.* ⟶ *Fresh to Strong.* ⟶ *Gale.* *Arrows fly with the Wind.*

OCTOBER & NOVEMBER, 1879.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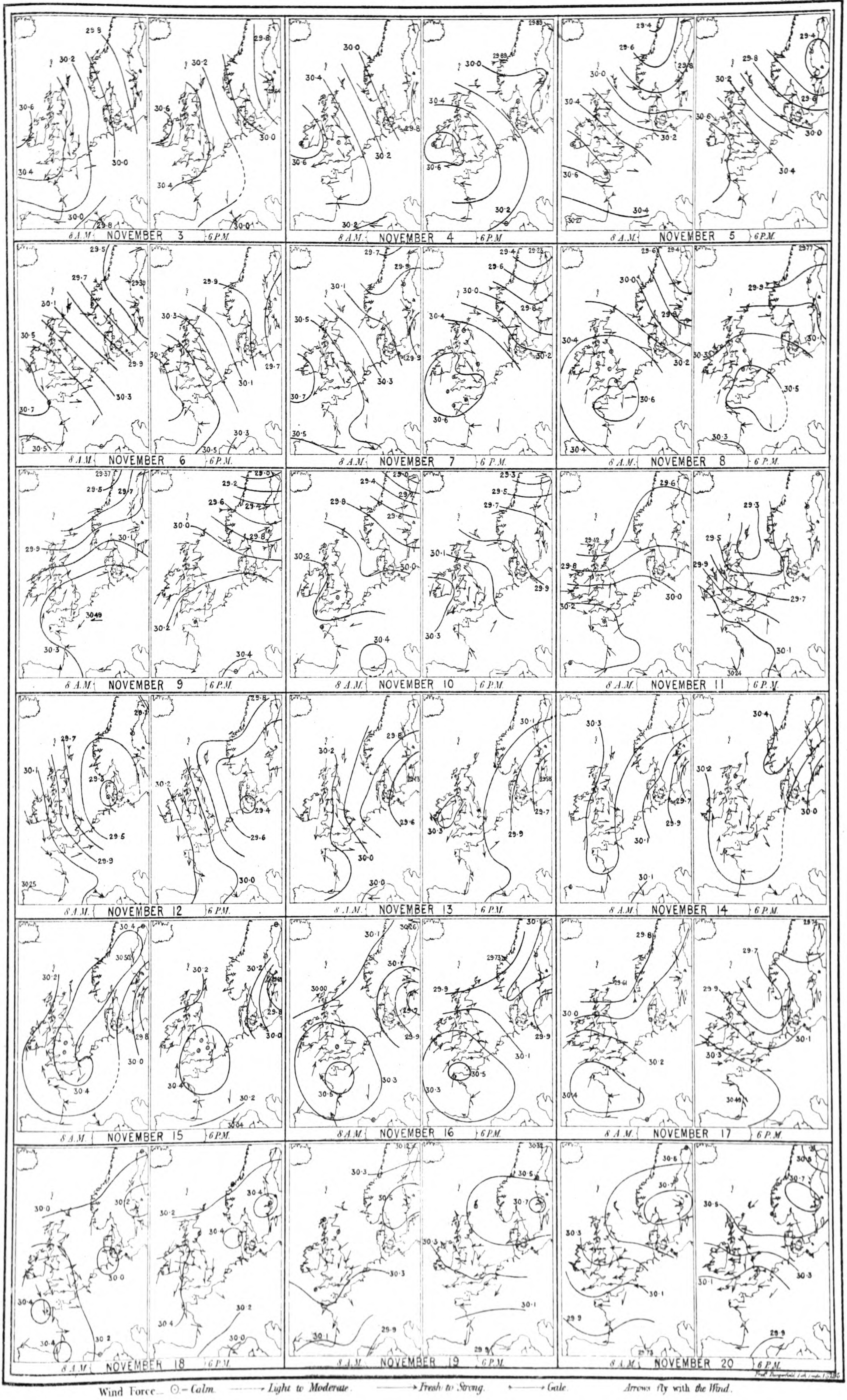
8 A.M. OCTOBER 17 6 P.M.
8 A.M. OCTOBER 18 6 P.M.
8 A.M. OCTOBER 19 6 P.M.
8 A.M. OCTOBER 20 6 P.M.
8 A.M. OCTOBER 21 6 P.M.
8 A.M. OCTOBER 22 6 P.M.
8 A.M. OCTOBER 23 6 P.M.
8 A.M. OCTOBER 24 6 P.M.
8 A.M. OCTOBER 25 6 P.M.
8 A.M. OCTOBER 26 6 P.M.
8 A.M. OCTOBER 27 6 P.M.
8 A.M. OCTOBER 28 6 P.M.
8 A.M. OCTOBER 29 6 P.M.
8 A.M. OCTOBER 30 6 P.M.
8 A.M. OCTOBER 31 6 P.M.
8 A.M. NOVEMBER 1 6 P.M.
8 A.M. NOVEMBER 2 6 P.M.

Wind Force — ⊙ — Calm. ——→ Light to Moderate. ——→ Fresh to Strong. ——→ Gale. Arrows fly with the Wind.

NOVEMBER, 1879.

Chart Plate. 18.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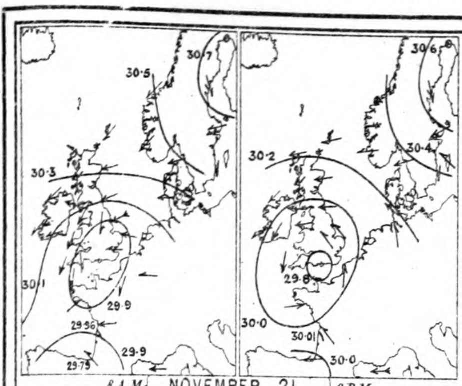
8 A.M. NOVEMBER 4 6 P.M.
8 A.M. NOVEMBER 5 6 P.M.
8 A.M. NOVEMBER 6 6 P.M.
8 A.M. NOVEMBER 7 6 P.M.
8 A.M. NOVEMBER 8 6 P.M.
8 A.M. NOVEMBER 9 6 P.M.
8 A.M. NOVEMBER 10 6 P.M.
8 A.M. NOVEMBER 11 6 P.M.
8 A.M. NOVEMBER 12 6 P.M.
8 A.M. NOVEMBER 13 6 P.M.
8 A.M. NOVEMBER 14 6 P.M.
8 A.M. NOVEMBER 15 6 P.M.
8 A.M. NOVEMBER 16 6 P.M.
8 A.M. NOVEMBER 17 6 P.M.
8 A.M. NOVEMBER 18 6 P.M.
8 A.M. NOVEMBER 19 6 P.M.
8 A.M. NOVEMBER 20 6 P.M.

Wind Force... ⊙ – Calm. ——→ Light to Moderate. ——→ Fresh to Strong. ——→ Gale. Arrows fly with the Wind.

NOVEMBER & DECEMBER, 1879.

Chart Plate 19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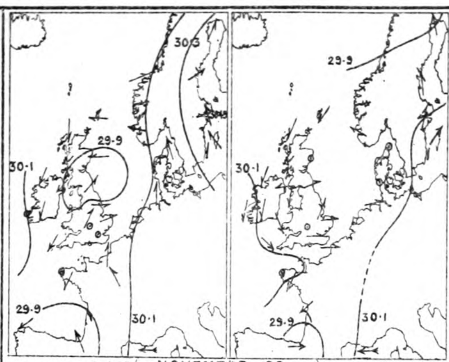
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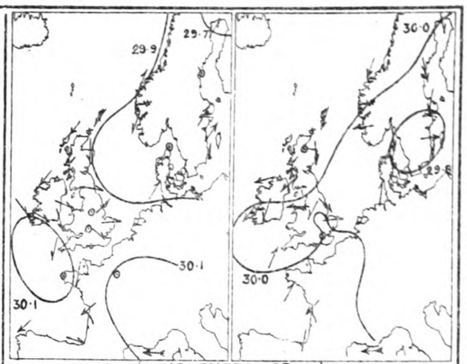
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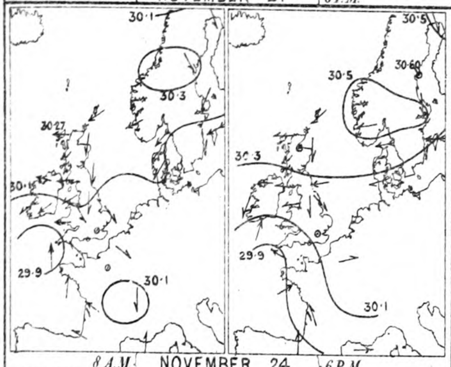
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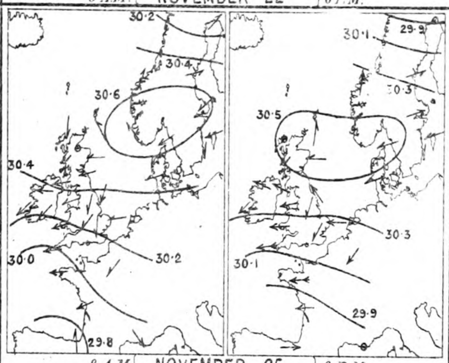
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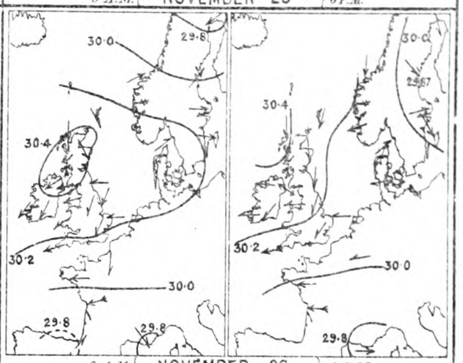
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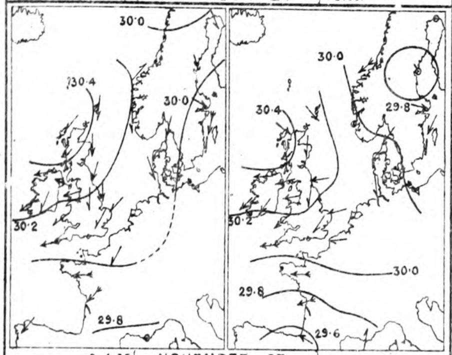
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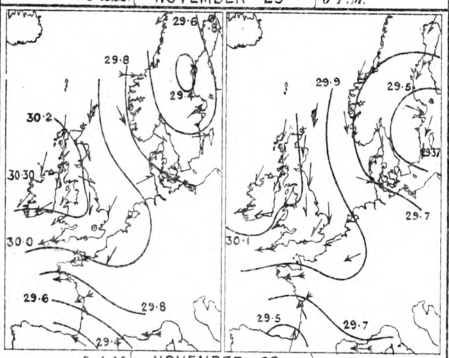
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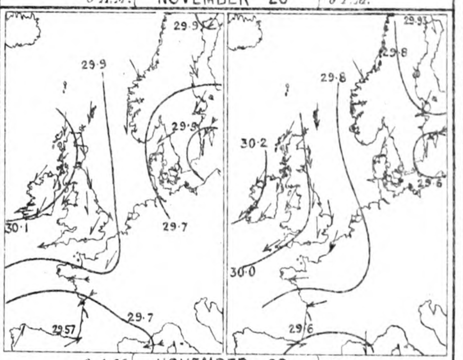
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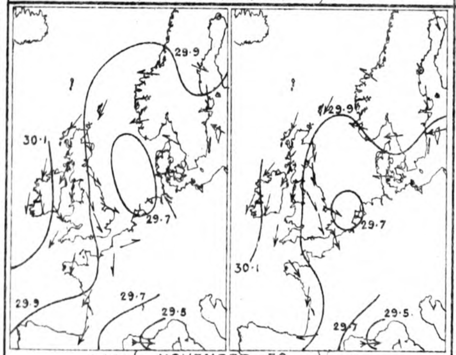
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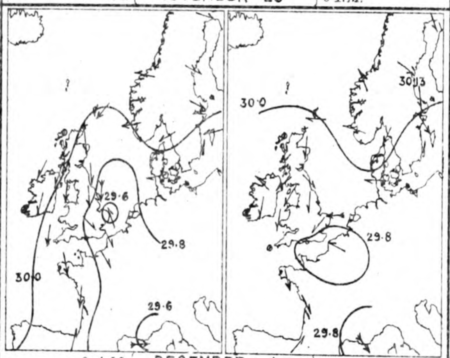
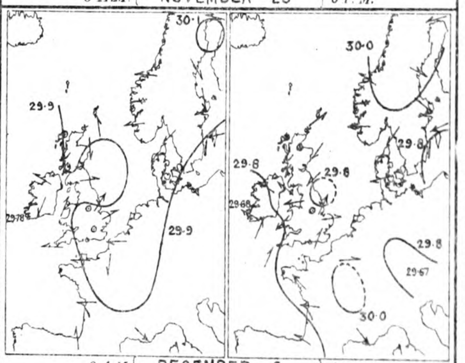
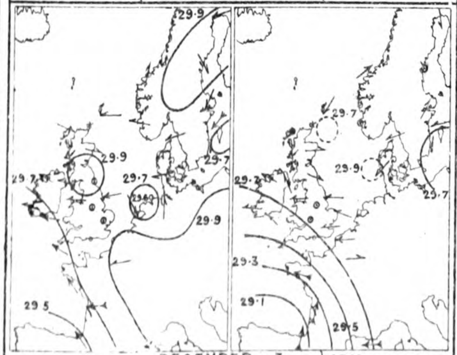

8 A.M. DECEMBER 1 6 P.M.


8 A.M. DECEMBER 2 6 P.M.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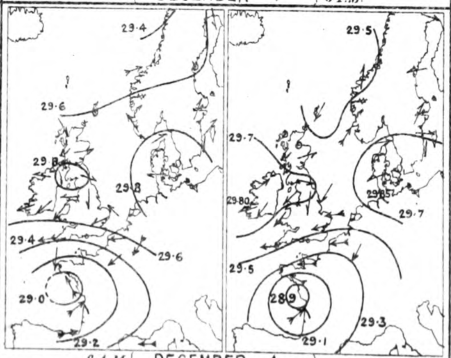
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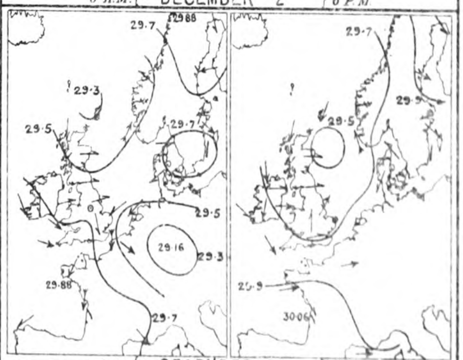
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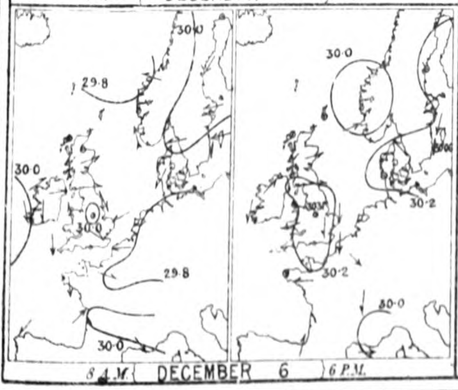
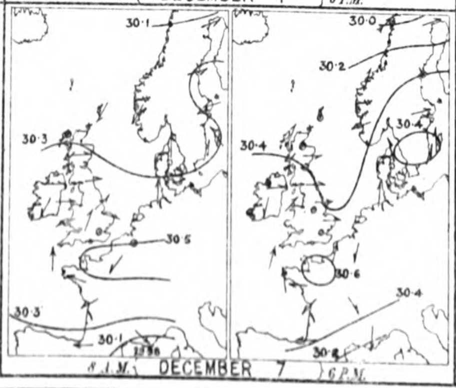

8 A.M. DECEMBER 6 6 P.M.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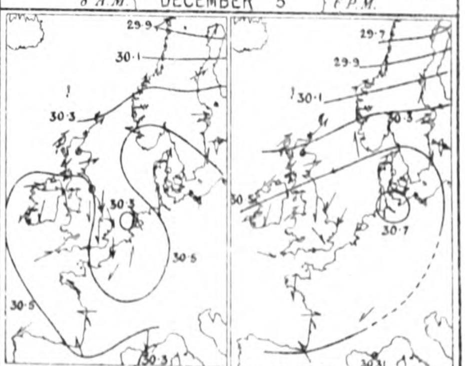
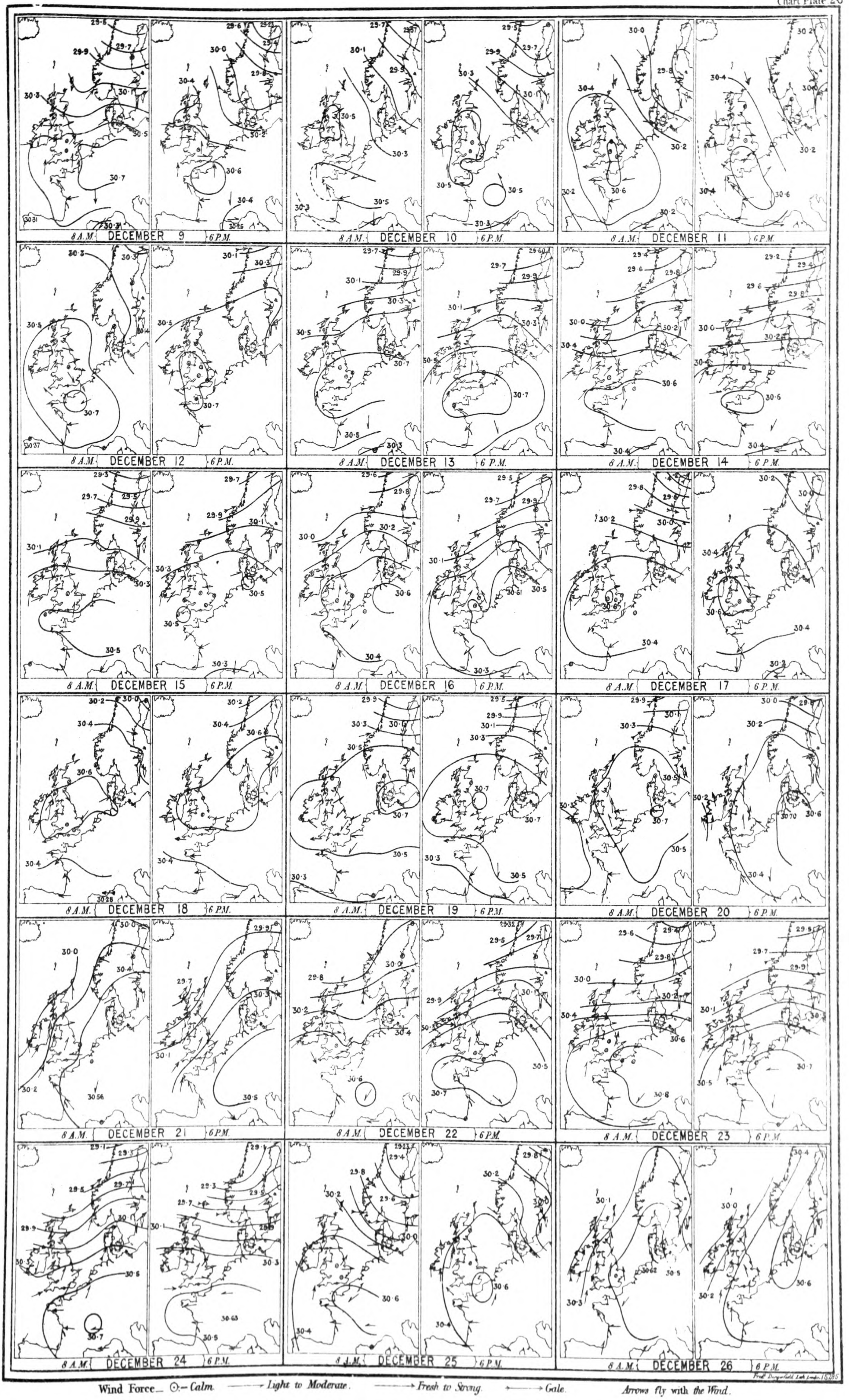

8 A.M. DECEMBER 8 6 P.M.

Fredk Dangerfield Lith London 15235

Wind Force _ ⊙ – Calm. ——→ Light to Moderate. ——→ Fresh to Strong. ——→ Gale. Arrows fly with the Wind.

DECEMBER 1879

Chart Plate 20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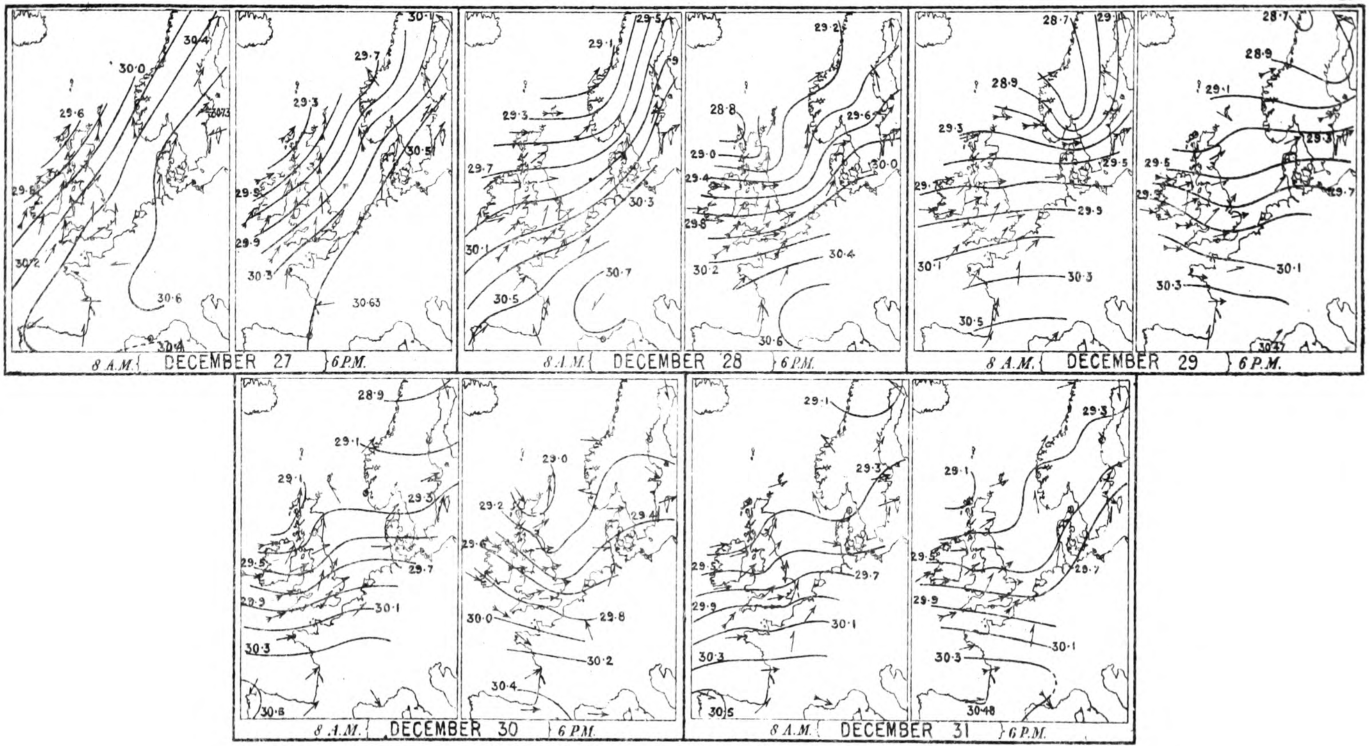
8 A.M. DECEMBER 10 6 P.M.
8 A.M. DECEMBER 11 6 P.M.
8 A.M. DECEMBER 12 6 P.M.
8 A.M. DECEMBER 13 6 P.M.
8 A.M. DECEMBER 14 6 P.M.
8 A.M. DECEMBER 15 6 P.M.
8 A.M. DECEMBER 16 6 P.M.
8 A.M. DECEMBER 17 6 P.M.
8 A.M. DECEMBER 18 6 P.M.
8 A.M. DECEMBER 19 6 P.M.
8 A.M. DECEMBER 20 6 P.M.
8 A.M. DECEMBER 21 6 P.M.
8 A.M. DECEMBER 22 6 P.M.
8 A.M. DECEMBER 23 6 P.M.
8 A.M. DECEMBER 24 6 P.M.
8 A.M. DECEMBER 25 6 P.M.
8 A.M. DECEMBER 26 6 P.M.

Fredk Dangerfield Lith London 15295

Wind Force _ ⊙ – *Calm.* ——→ *Light to Moderate.* ——→ *Fresh to Strong.* ——→ *Gale.* *Arrows fly with the Wind.*

DECEMBER, 1879.

Chart Plate **21**.

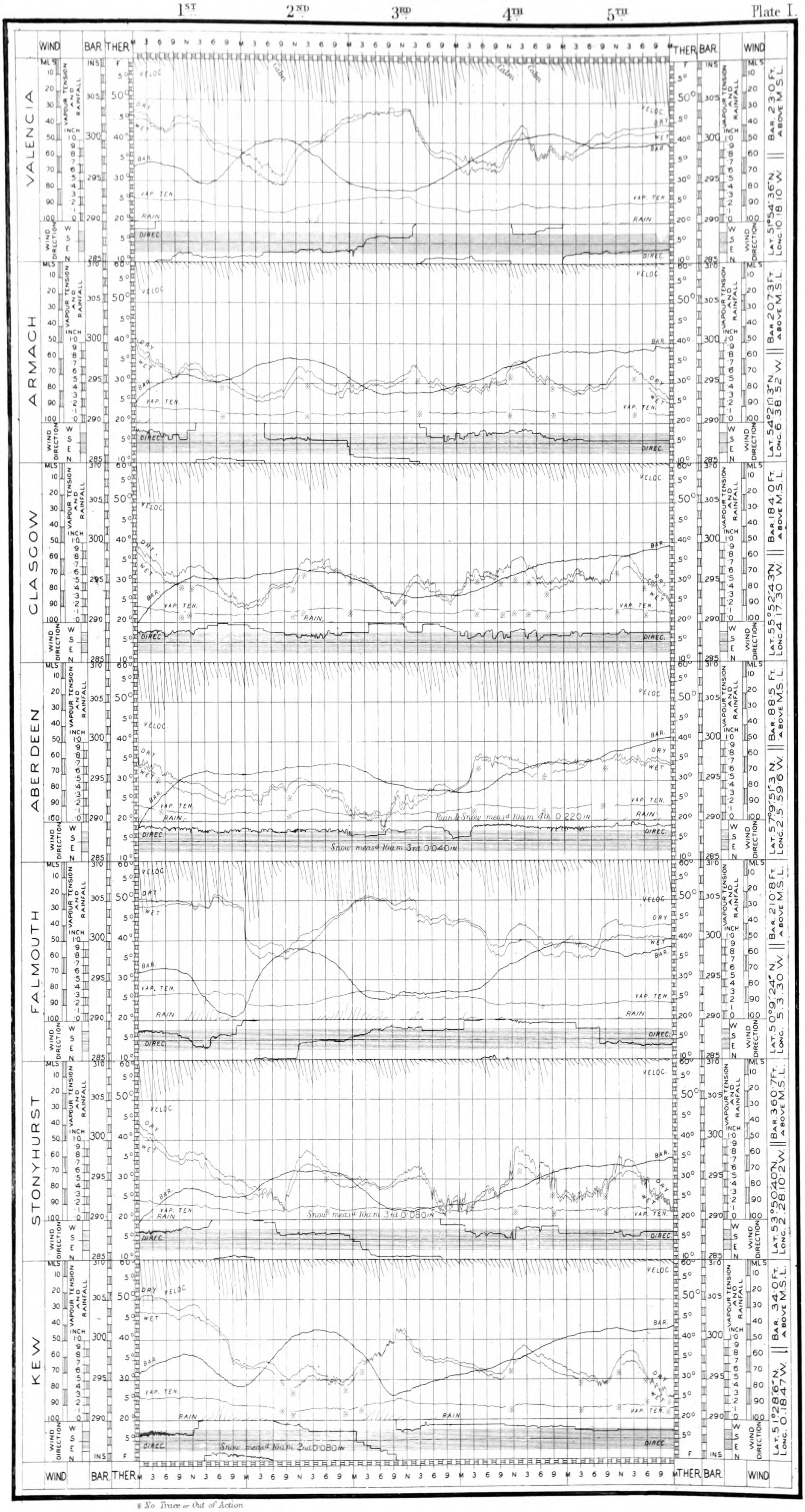

8 A.M. { DECEMBER 27 } 6 P.M.
30·0
30·4
29·6
29·6
30·2
30·6
30·4
30·1
29·7
29·3
29·9
29·9
30·3
30·5
30·63
8 A.M. { DECEMBER 28 } 6 P.M.
29·5
29·1
29·3
29·7
30·1
30·3
30·5
30·7
29·2
28·8
29·0
29·4
29·8
29·6
30·0
30·2
30·4
30·6
8 A.M. { DECEMBER 29 } 6 P.M.
28·7
29·1
28·9
29·3
29·7
29·5
29·9
30·1
30·3
30·5
28·7
28·9
29·1
29·3
29·5
29·5
29·7
30·1
30·3
30·37
8 A.M. { DECEMBER 30 } 6 P.M.
28·9
29·1
29·1
29·3
29·5
29·7
29·9
30·1
30·3
30·6
29·0
29·2
29·6
29·4
30·0
29·8
30·2
30·4
8 A.M. { DECEMBER 31 } 6 P.M.
29·1
29·3
29·5
29·7
29·9
30·1
30·3
30·5
29·3
29·1
29·5
29·7
29·9
30·1
30·3
30·48

Wind Force_ ⊙:– *Calm.* ——→ *Light to Moderate.* ——→ *Fresh to Strong.* →——→ *Gale.* *Arrows fly with the Wind.*

Fred^k Dangerfield Lith. London 15294

JANUARY — 1879.

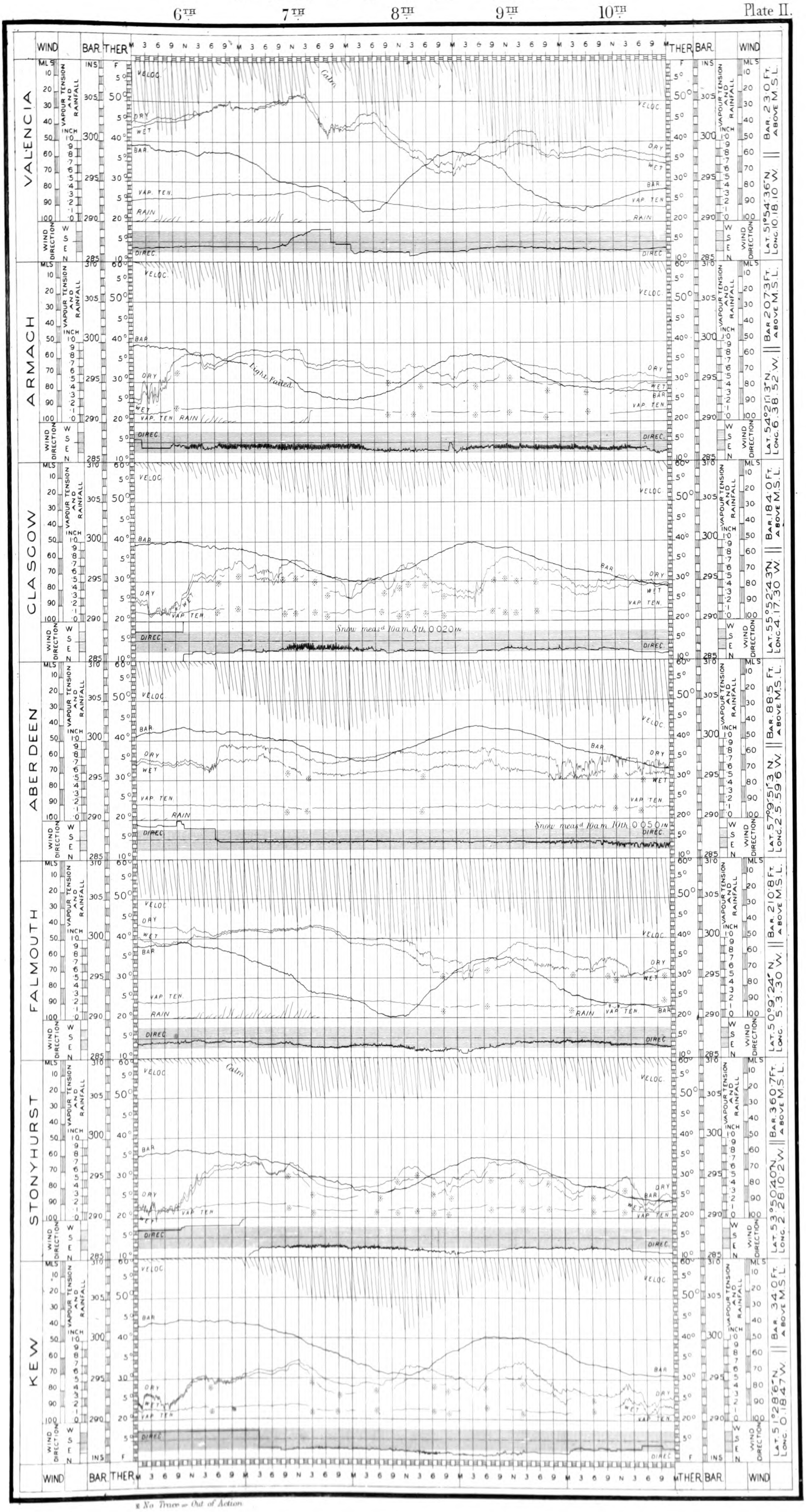
Plate I.



* No Trace or Out of Action

JANUARY — 1879.

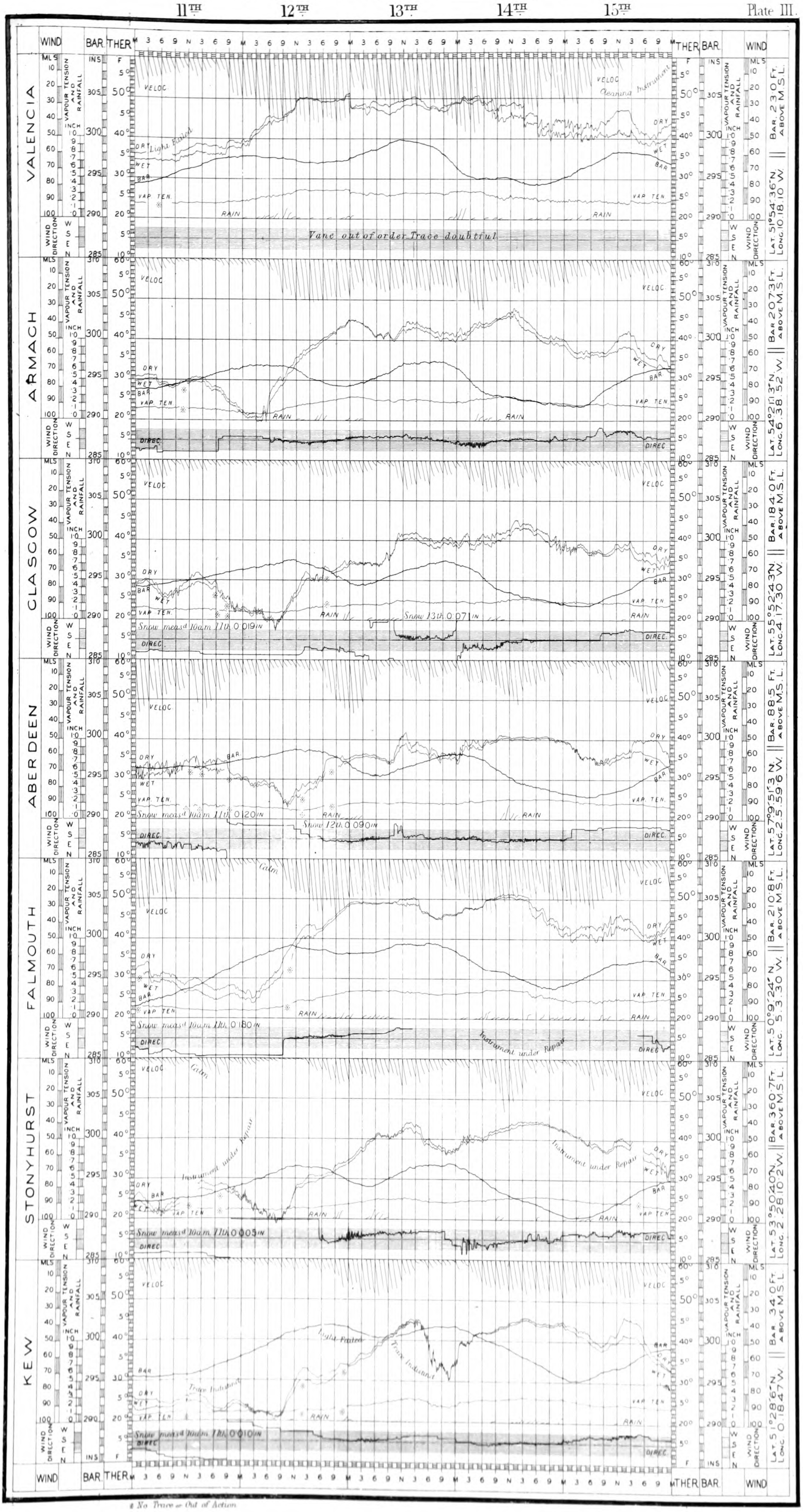
Plate II.



* No Trace = Out of Action

JANUARY — 1879.

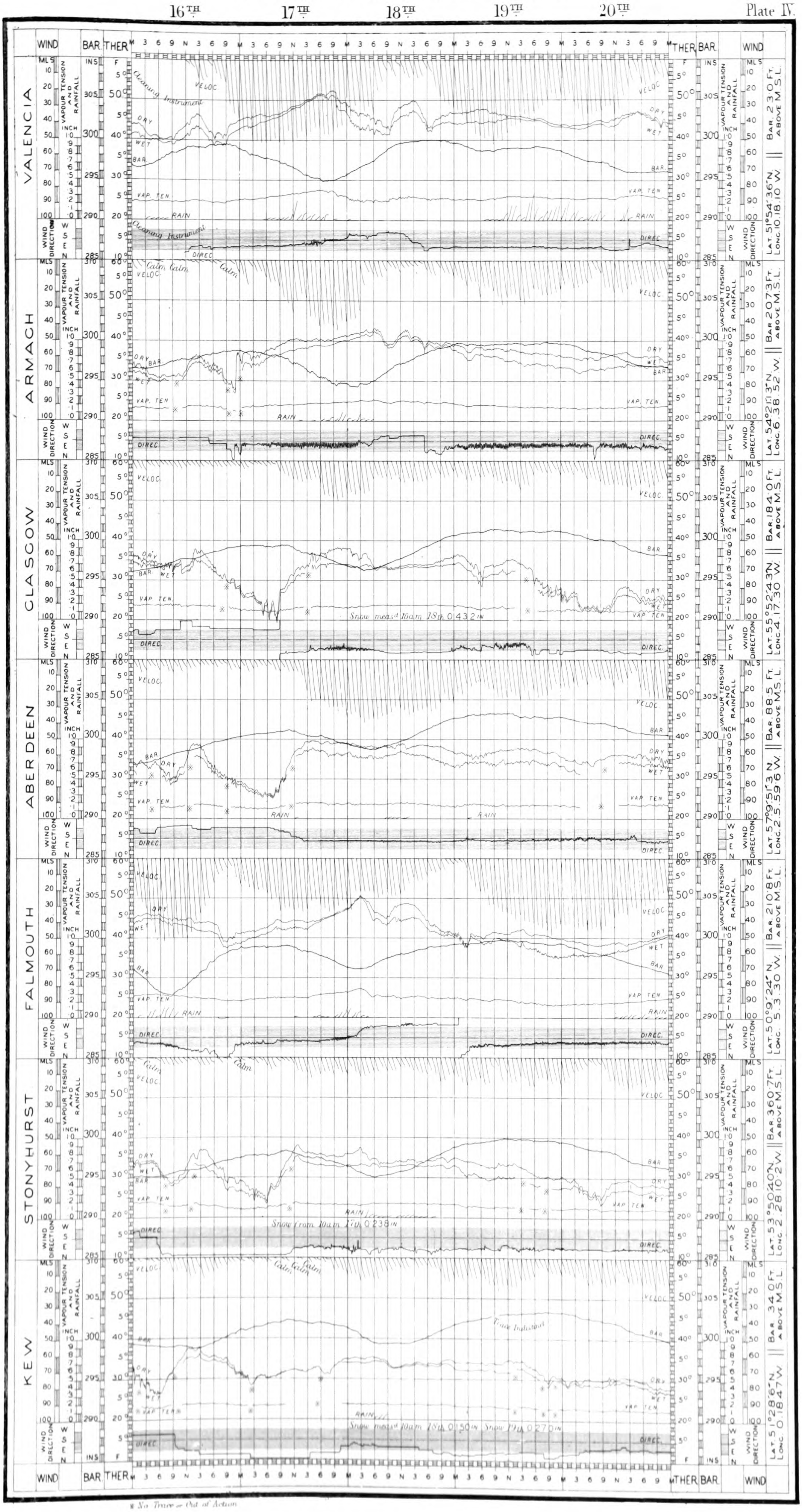
Plate III.



* No Trace or Out of Action

JANUARY — 1879.

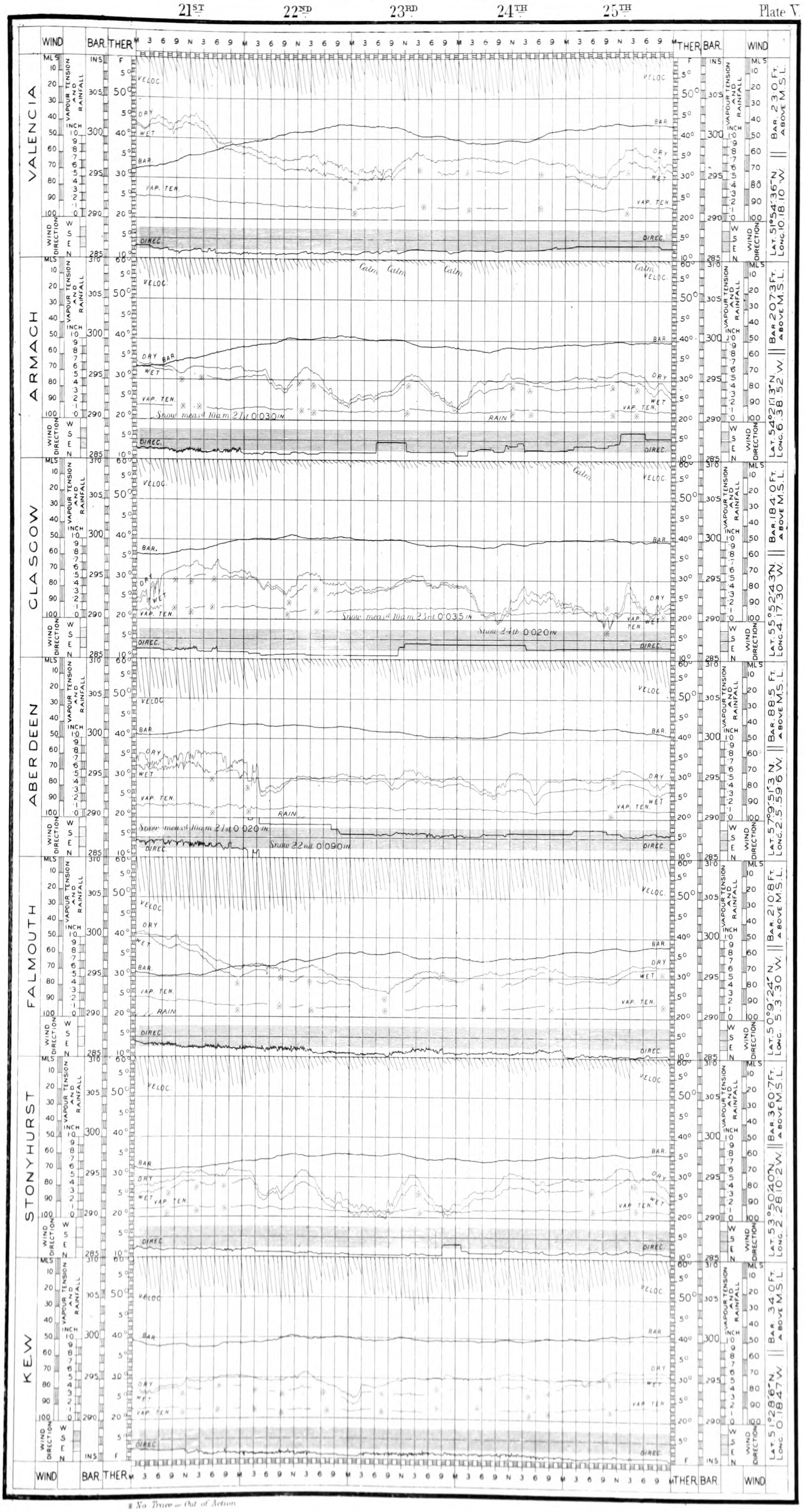
Plate IV.



✻ No Trace or Out of Action

JANUARY — 1879.

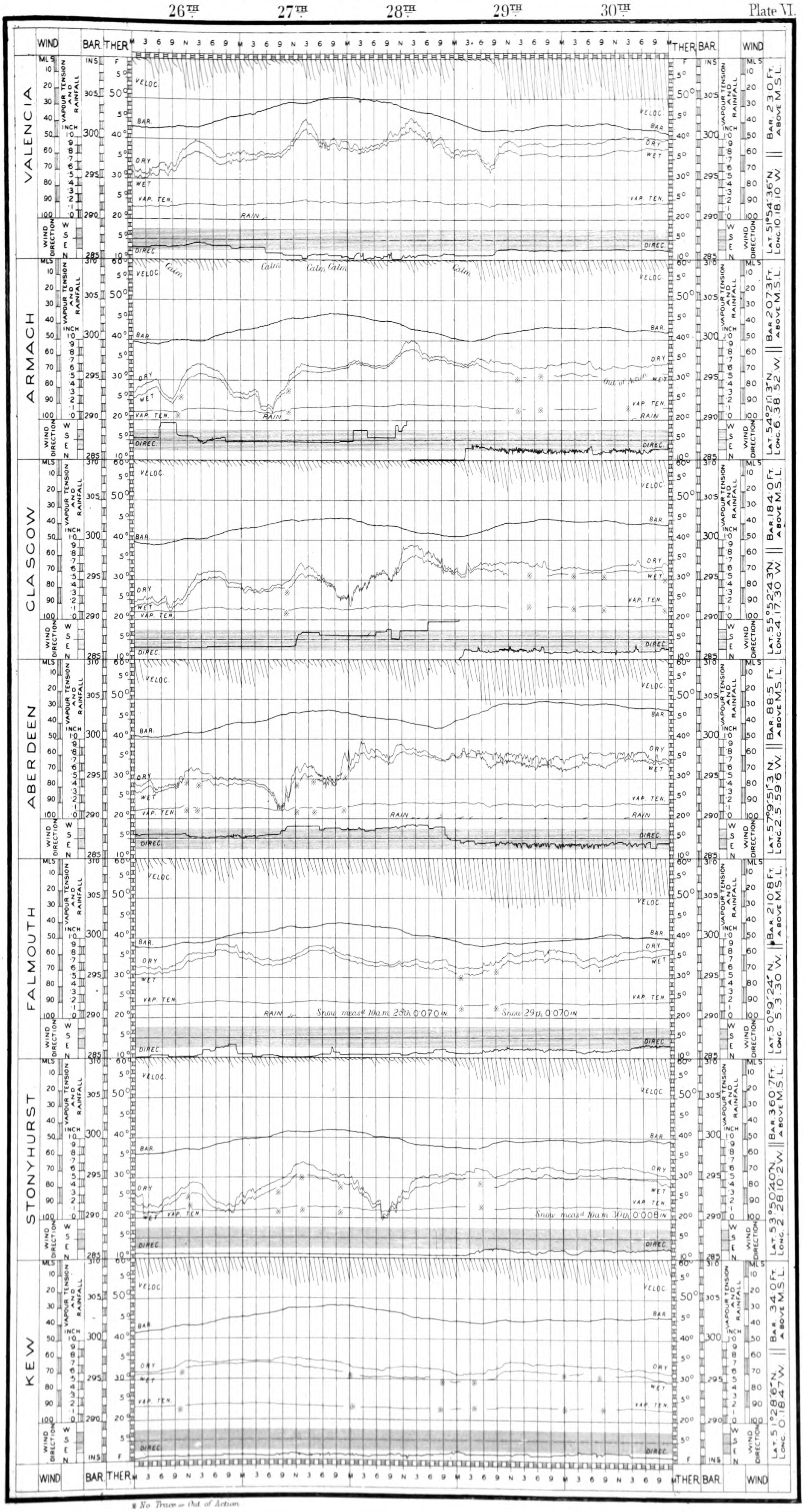
Plate V.



* No Trace or Out of Action

JANUARY — 1879.

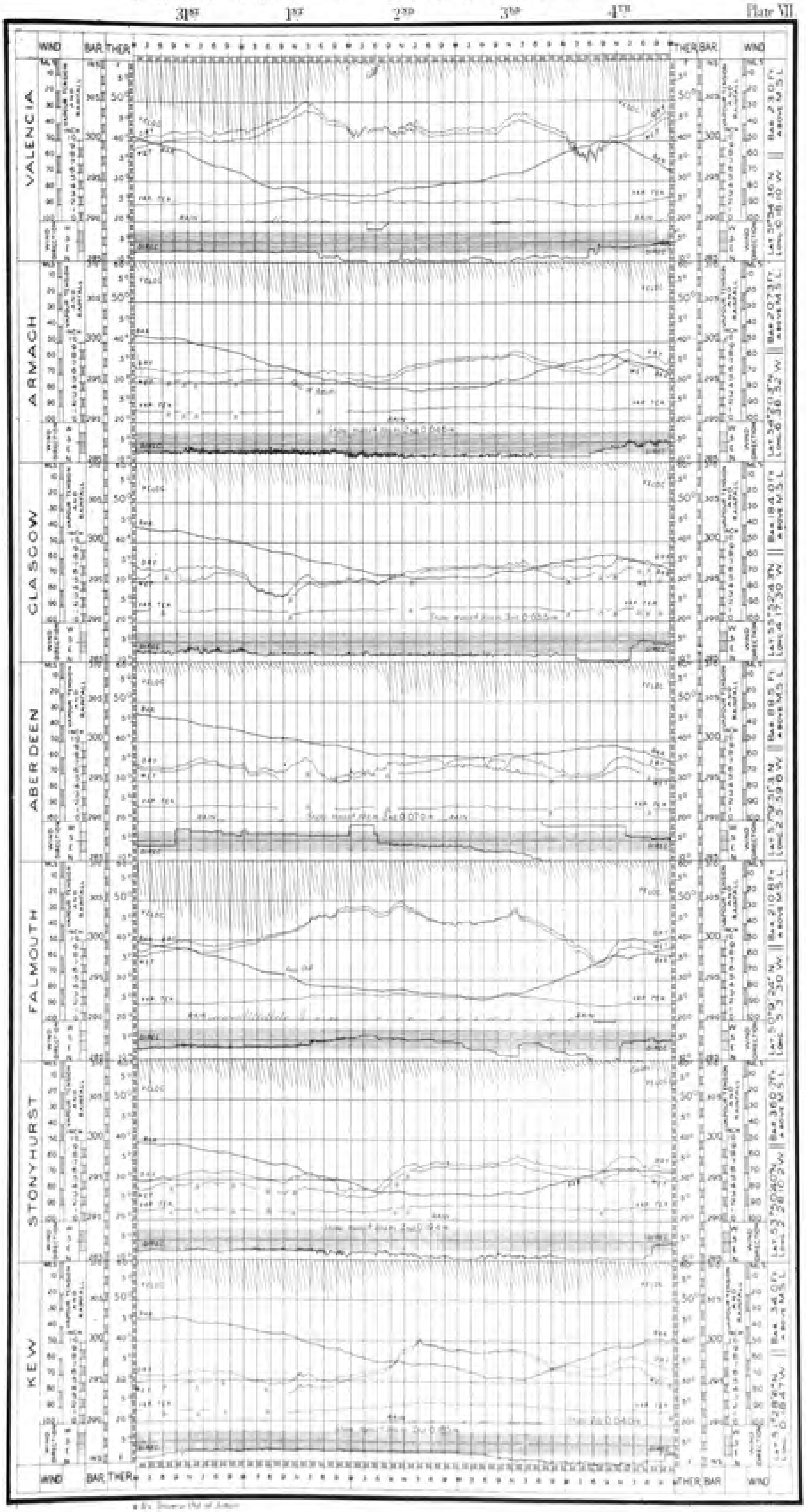
Plate VI.



* No Trace or Out of Action

JANUARY & FEBRUARY — 1879

Plate VII



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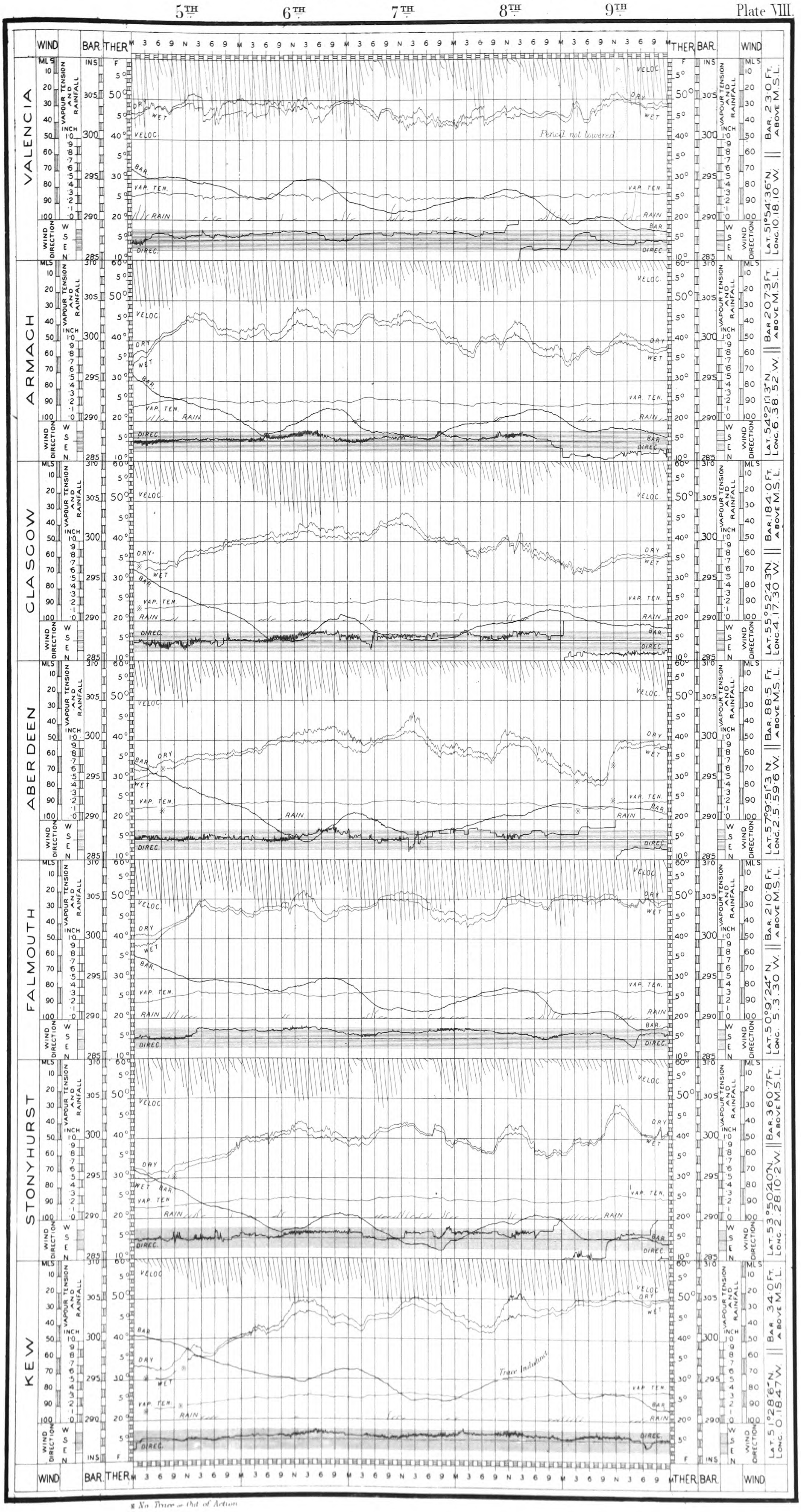
FEBRUARY — 1879.

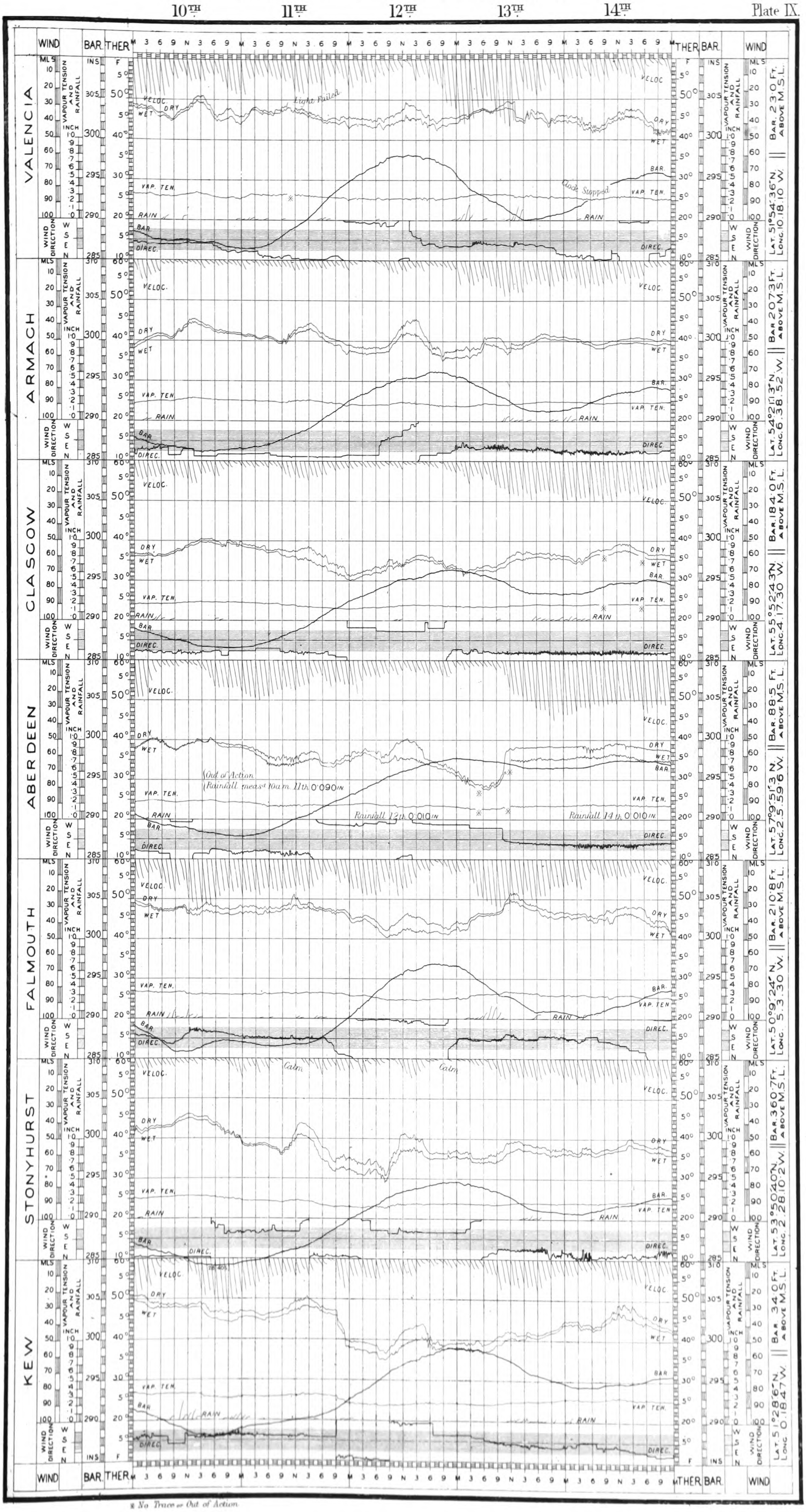
Plate VIII.



* No Trace or Out of Action

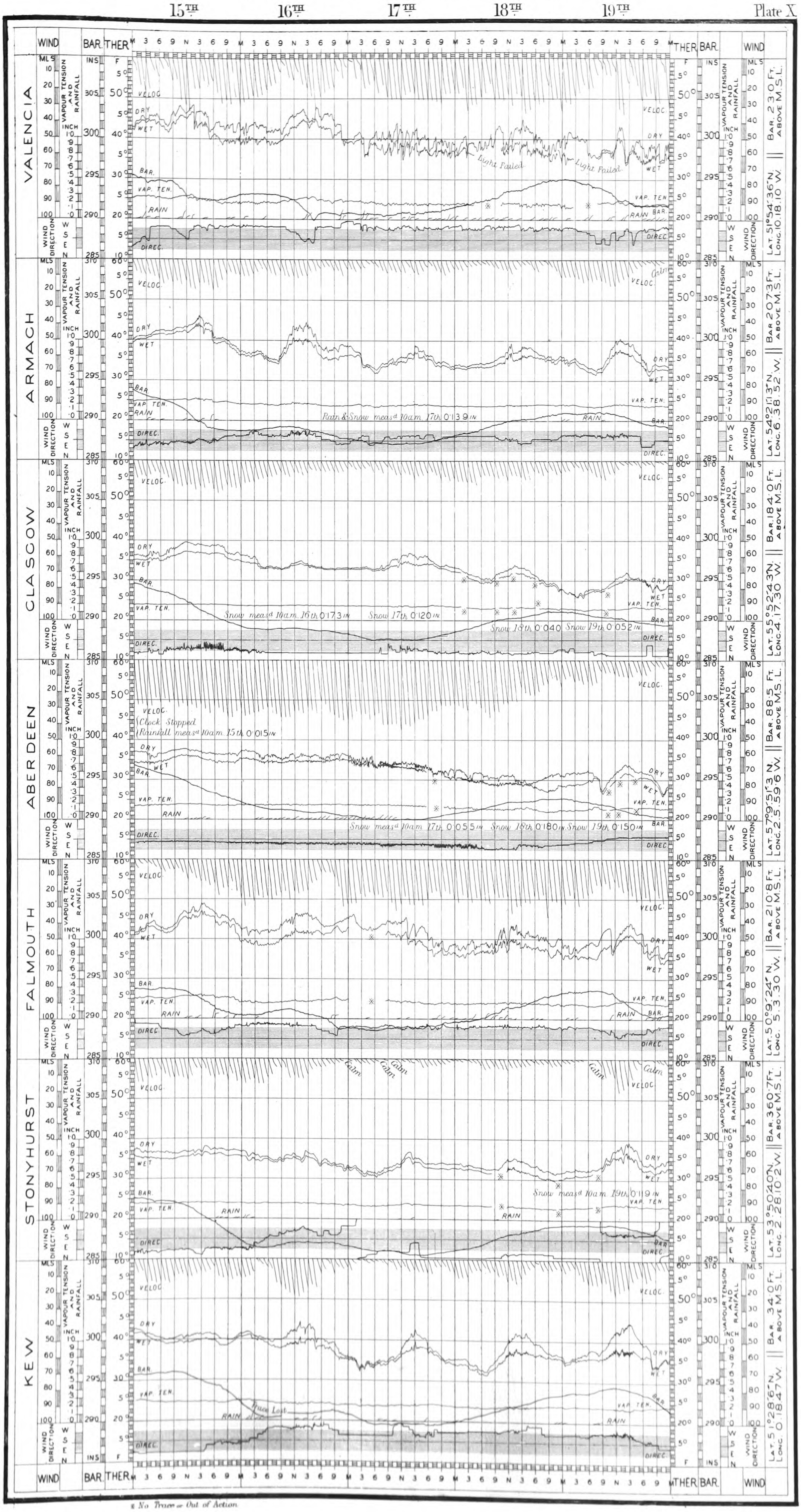
FEBRUARY — 1879.

Plate IX.



* No Trace or Out of Action

FEBRUARY — 1879.

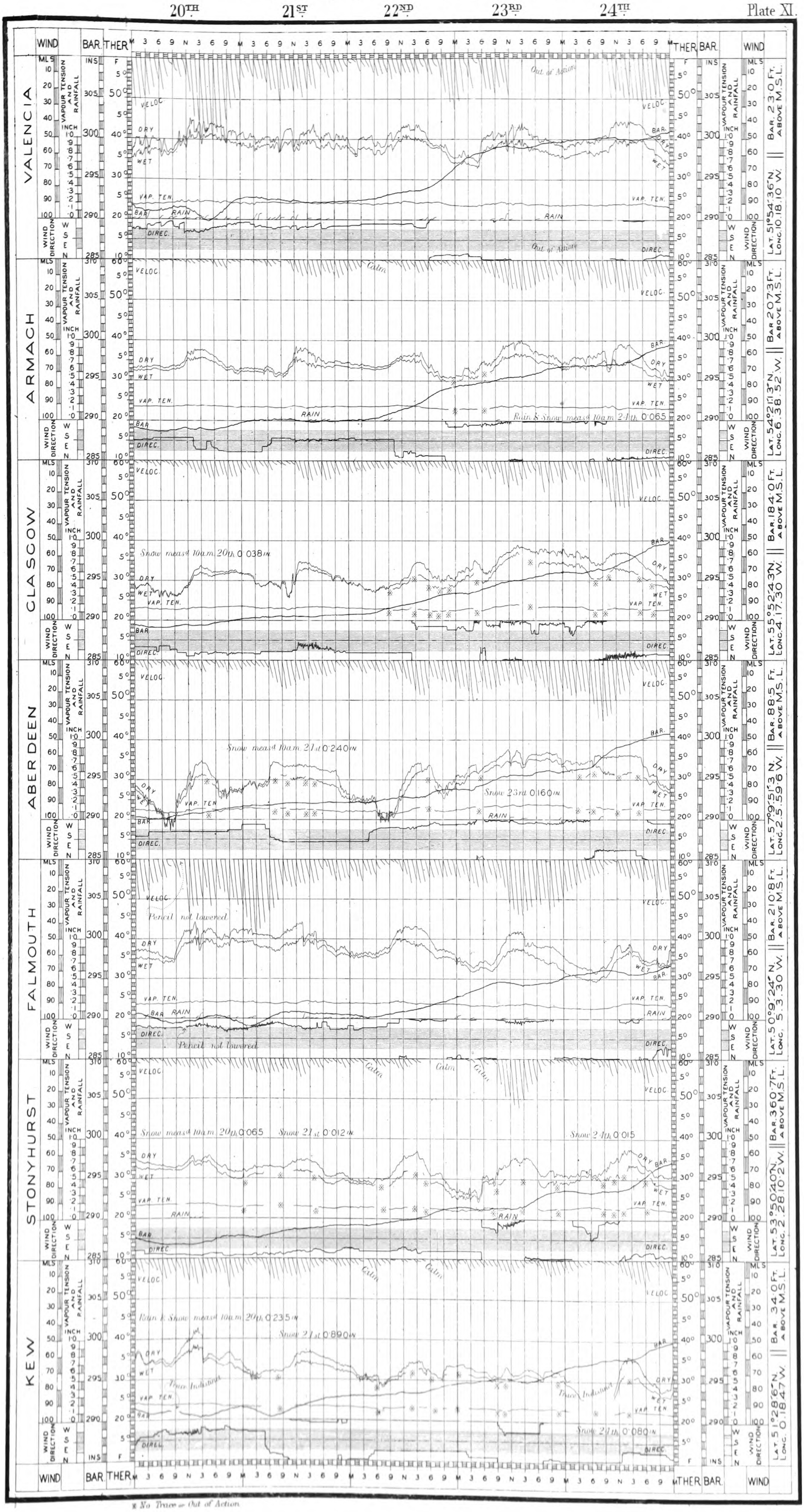


※ No Trace or Out of Action.

FEBRUARY — 1879.

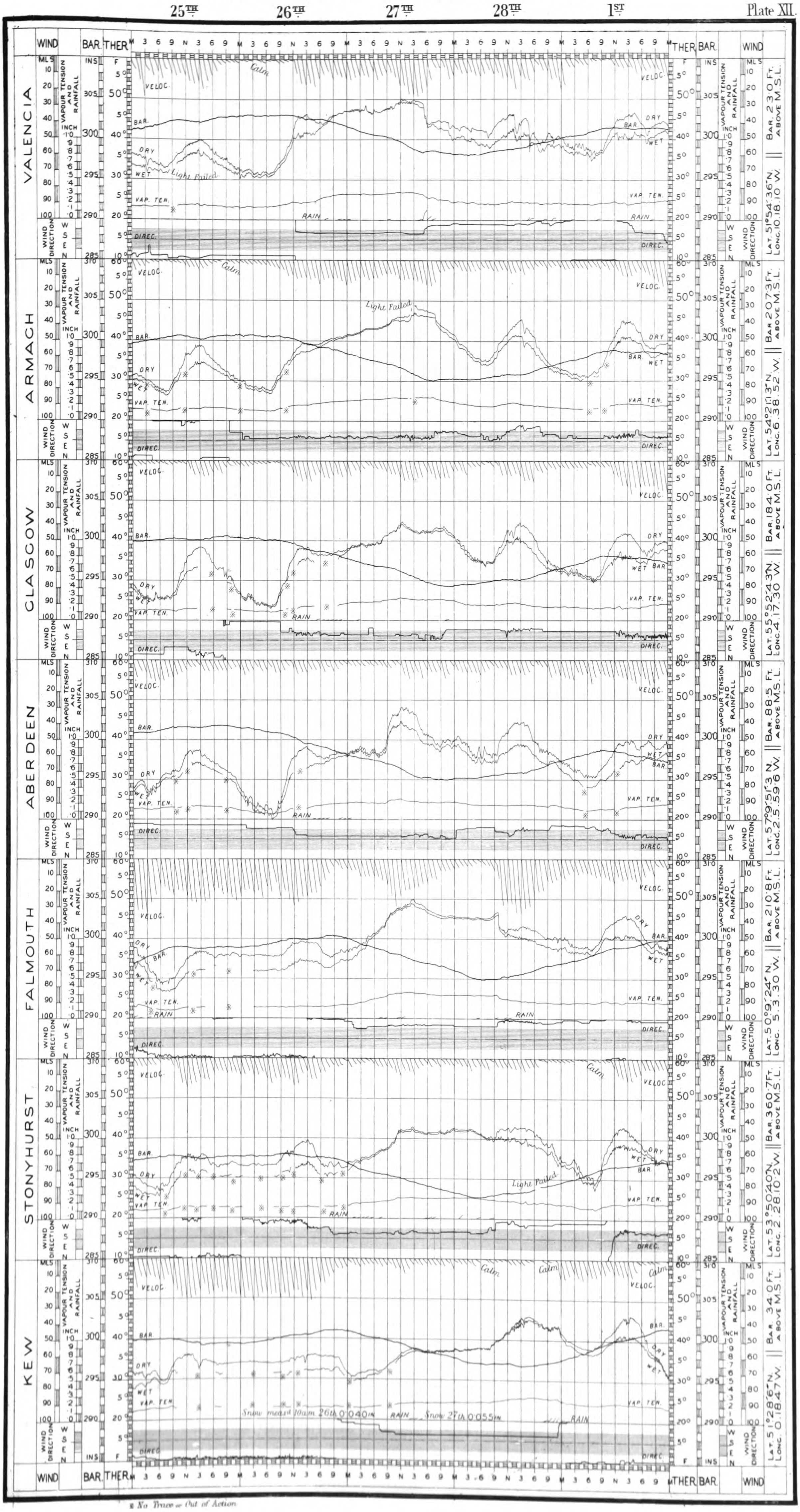
20TH 21ST 22ND 23RD 24TH

Plate XI.



* No Trace or Out of Action

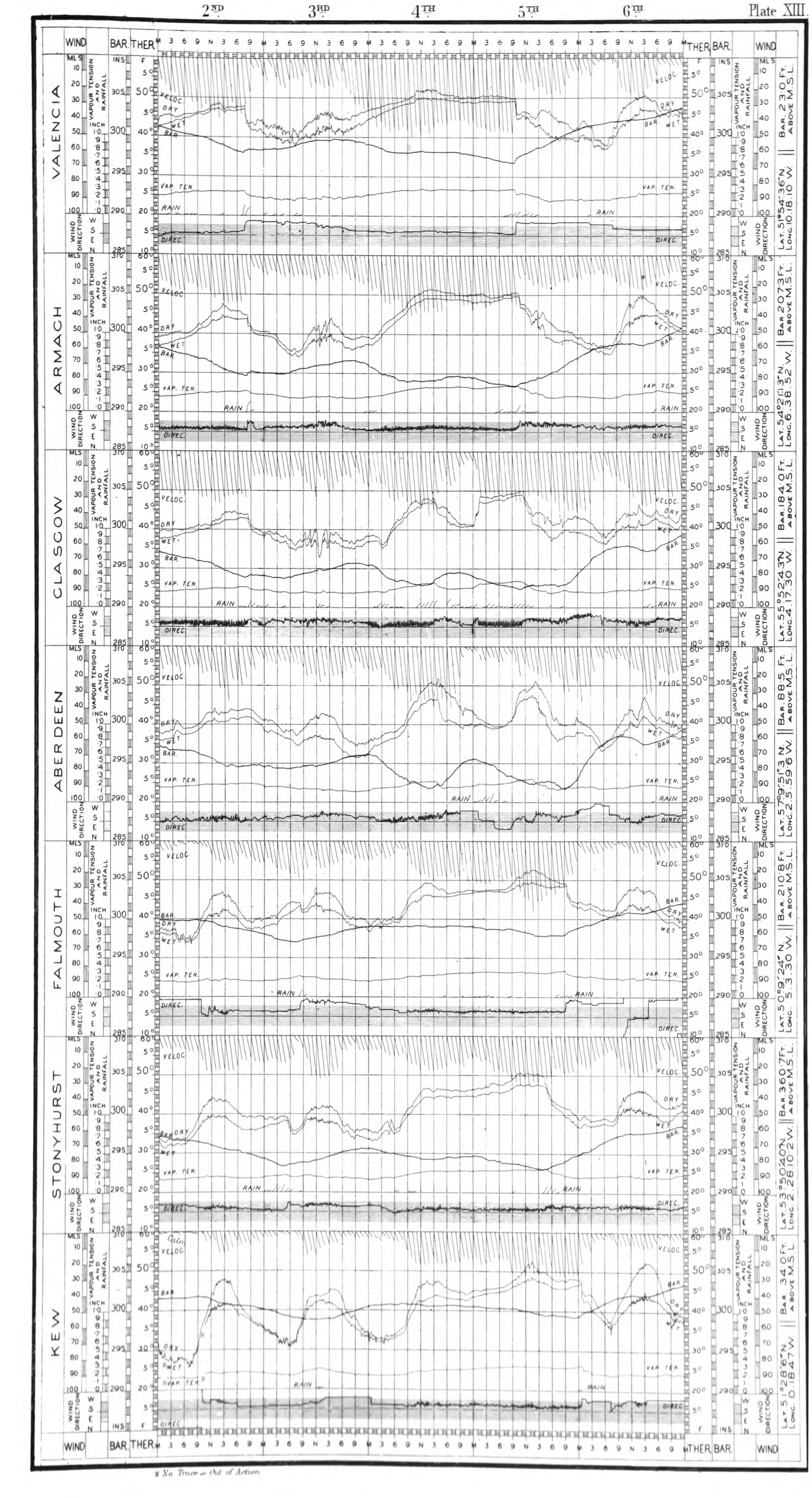
FEBRUARY & MARCH—1879.



* No Trace — Out of Action

M A R C H — 1 8 7 9.

Plate XIII.

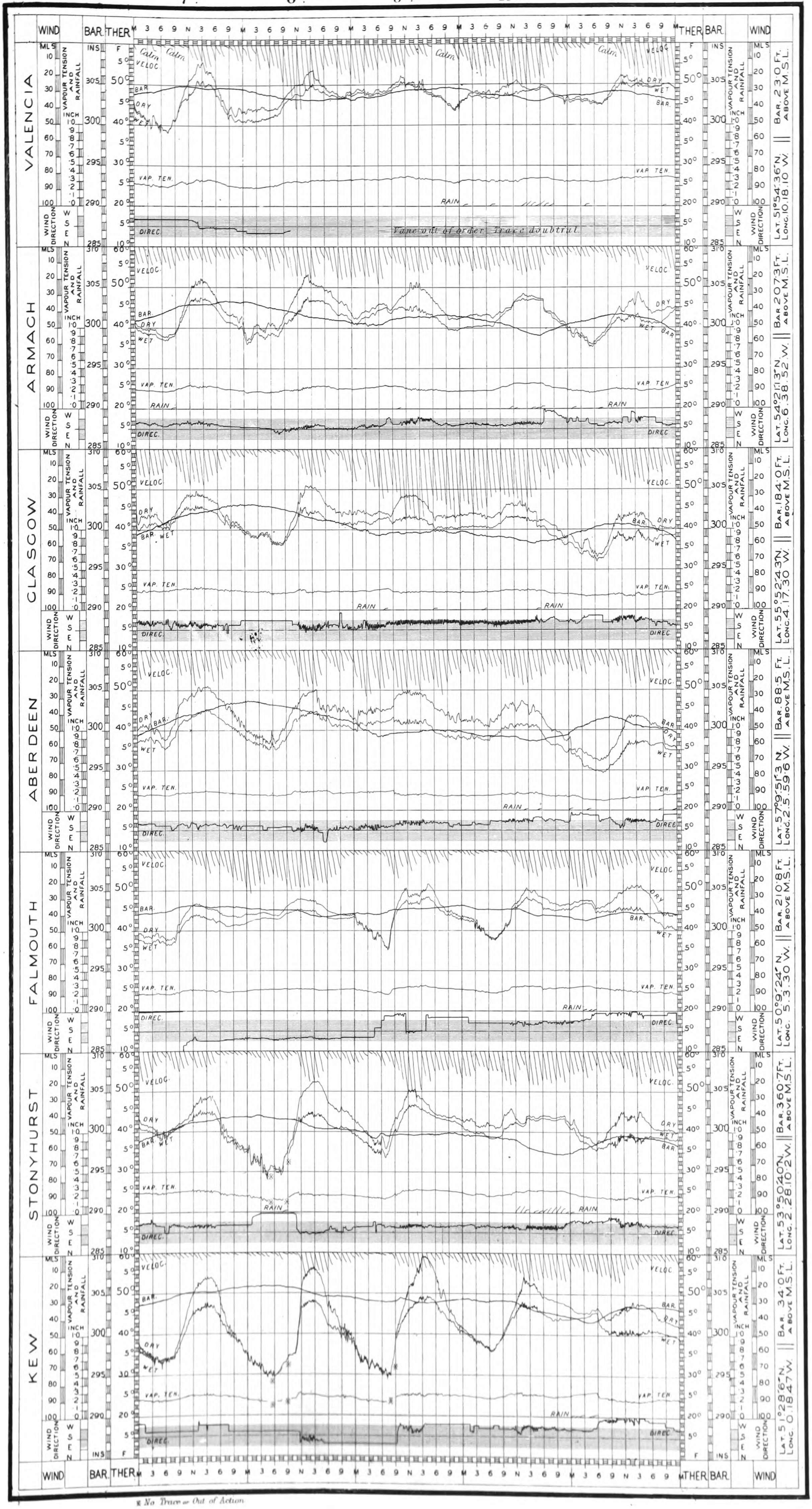


× No Trace or Out of Action

MARCH — 1879.

7th 8th 9th 10th 11th

Plate XIV.



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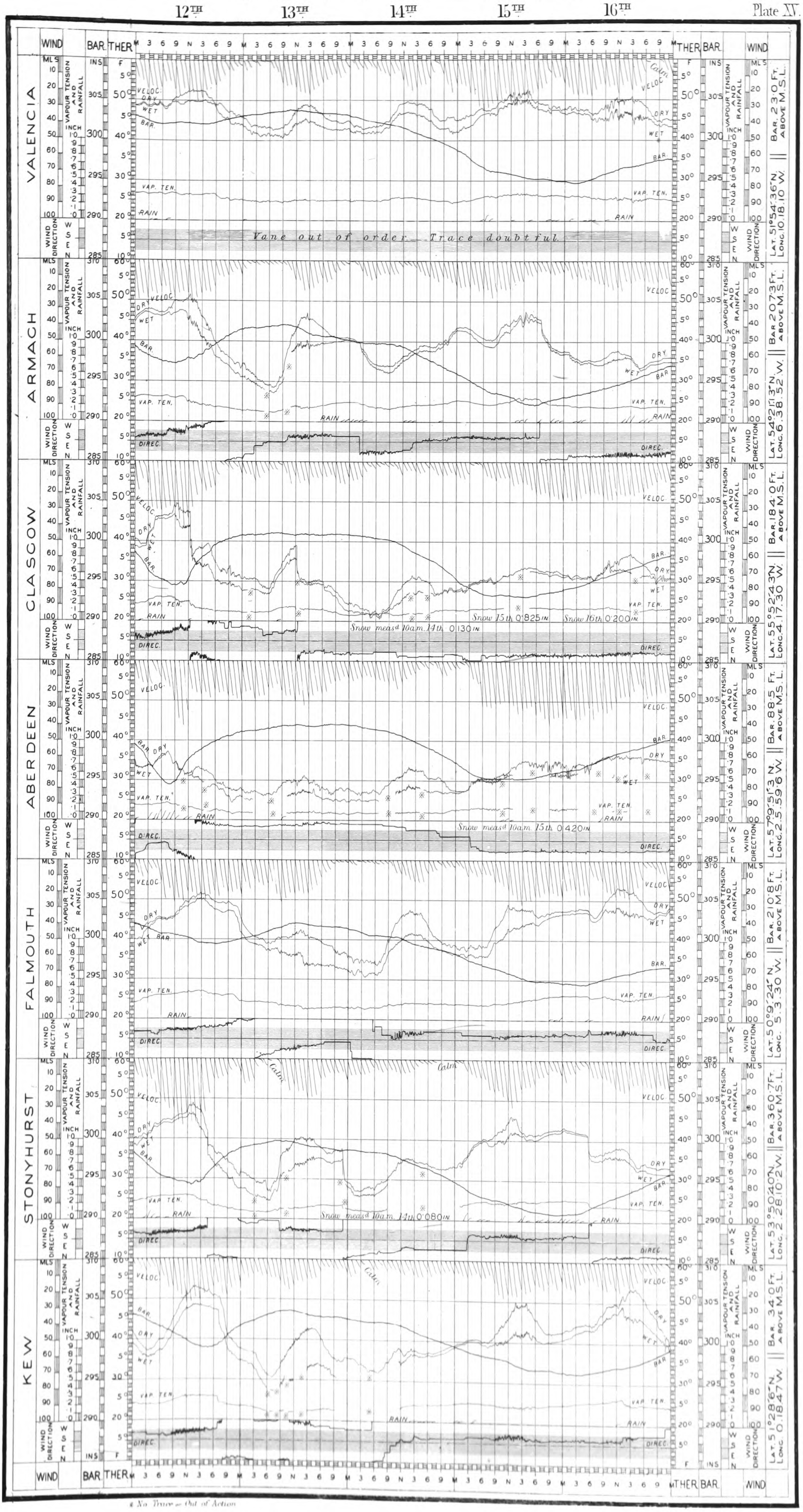
MARCH — 1879.

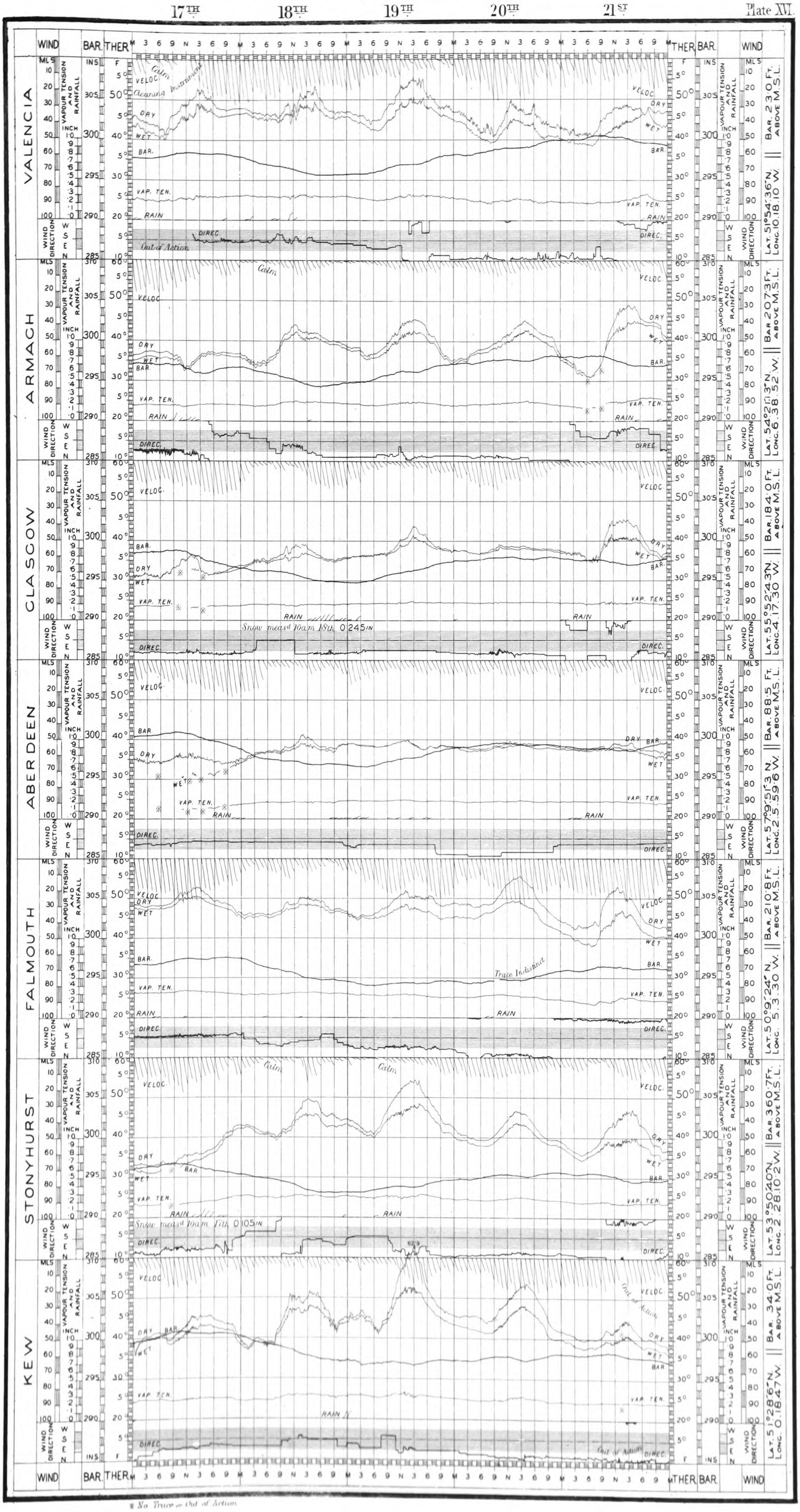
Plate XV.



* No Trace = Out of Action

MARCH — 1879.

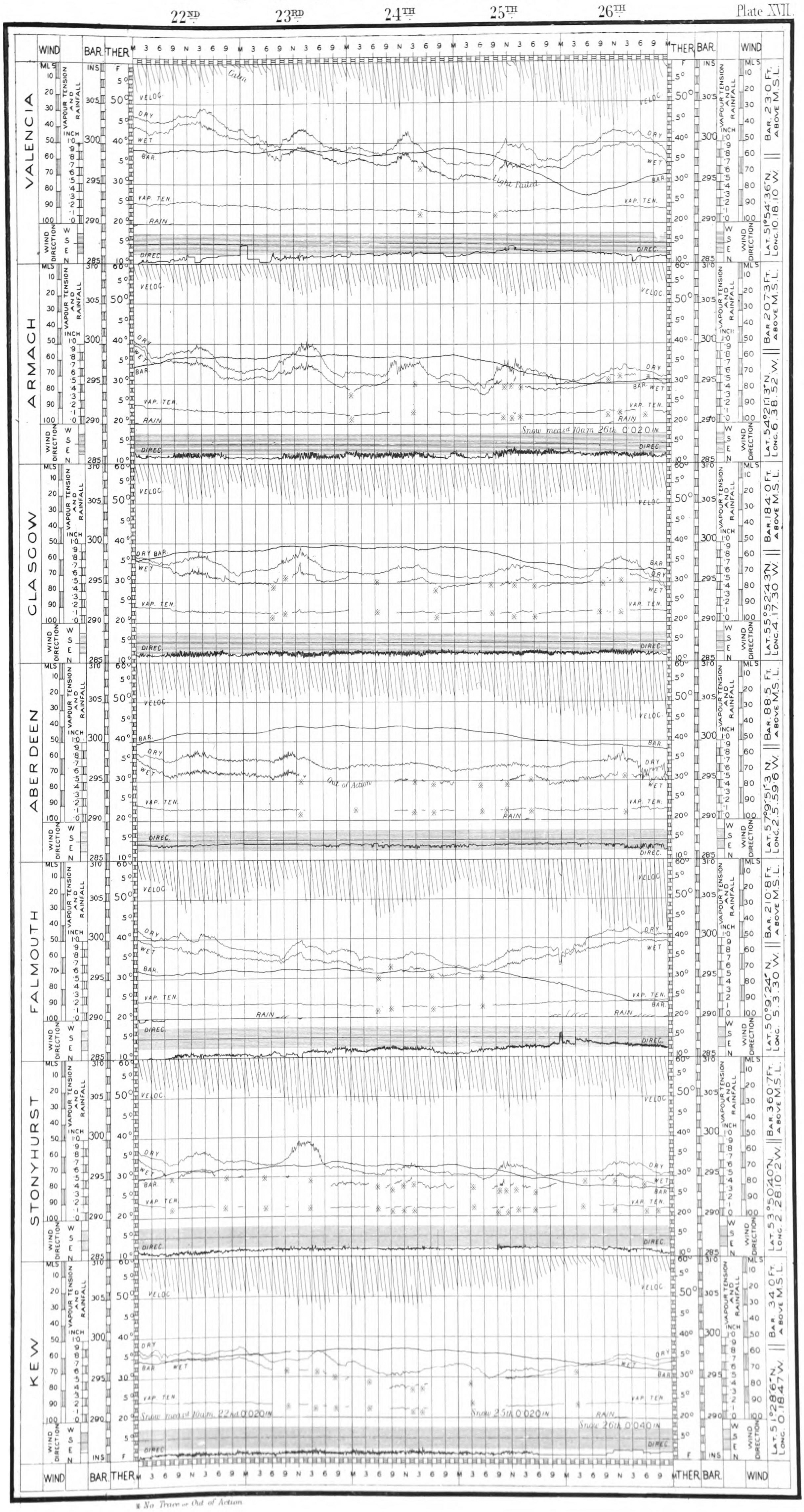
Plate XVI.



* No Trace or Out of Action

MARCH — 1879.

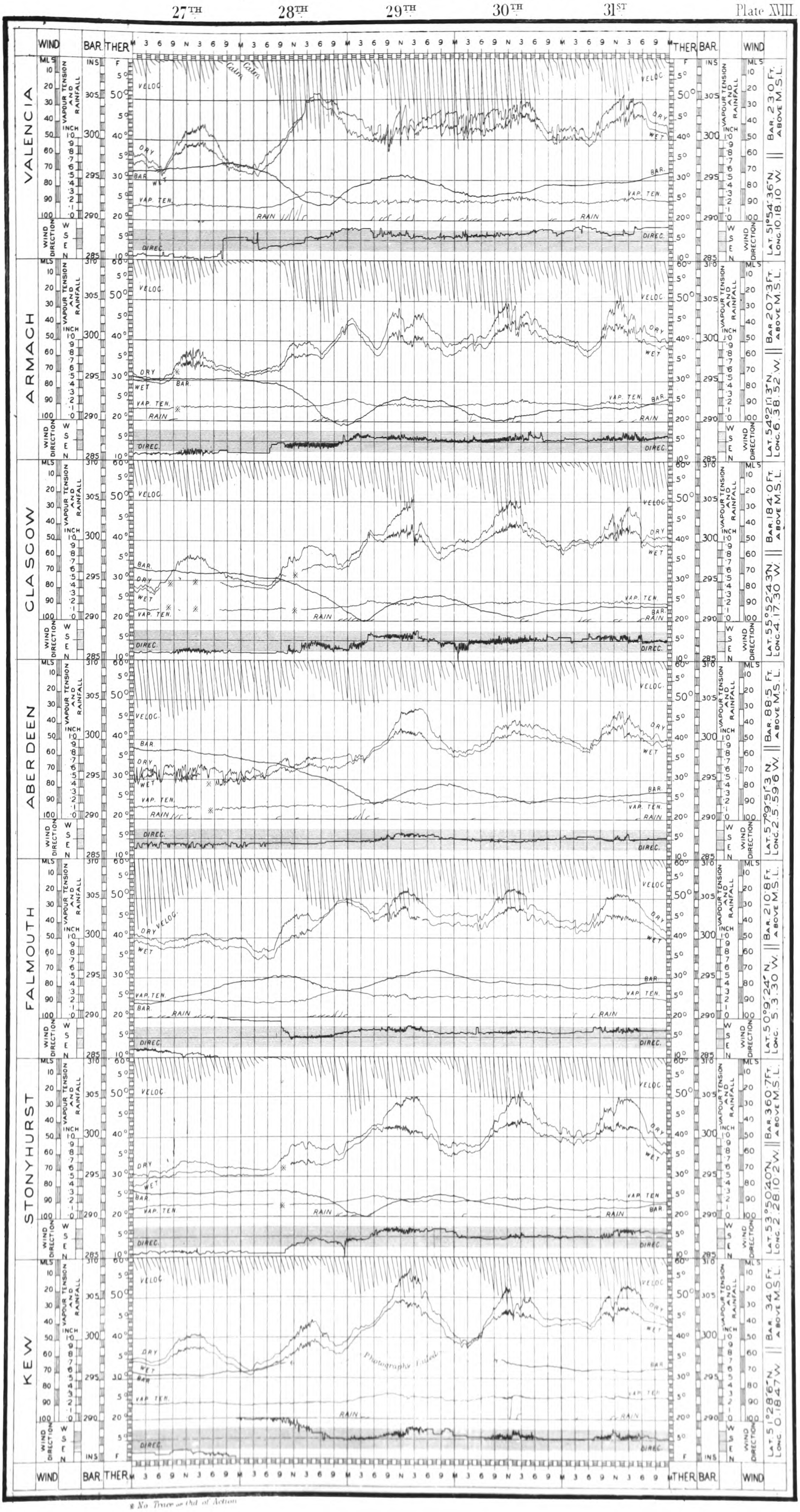
Plate XVII.



* No Trace or Out of Action

M A R C H — 1879.

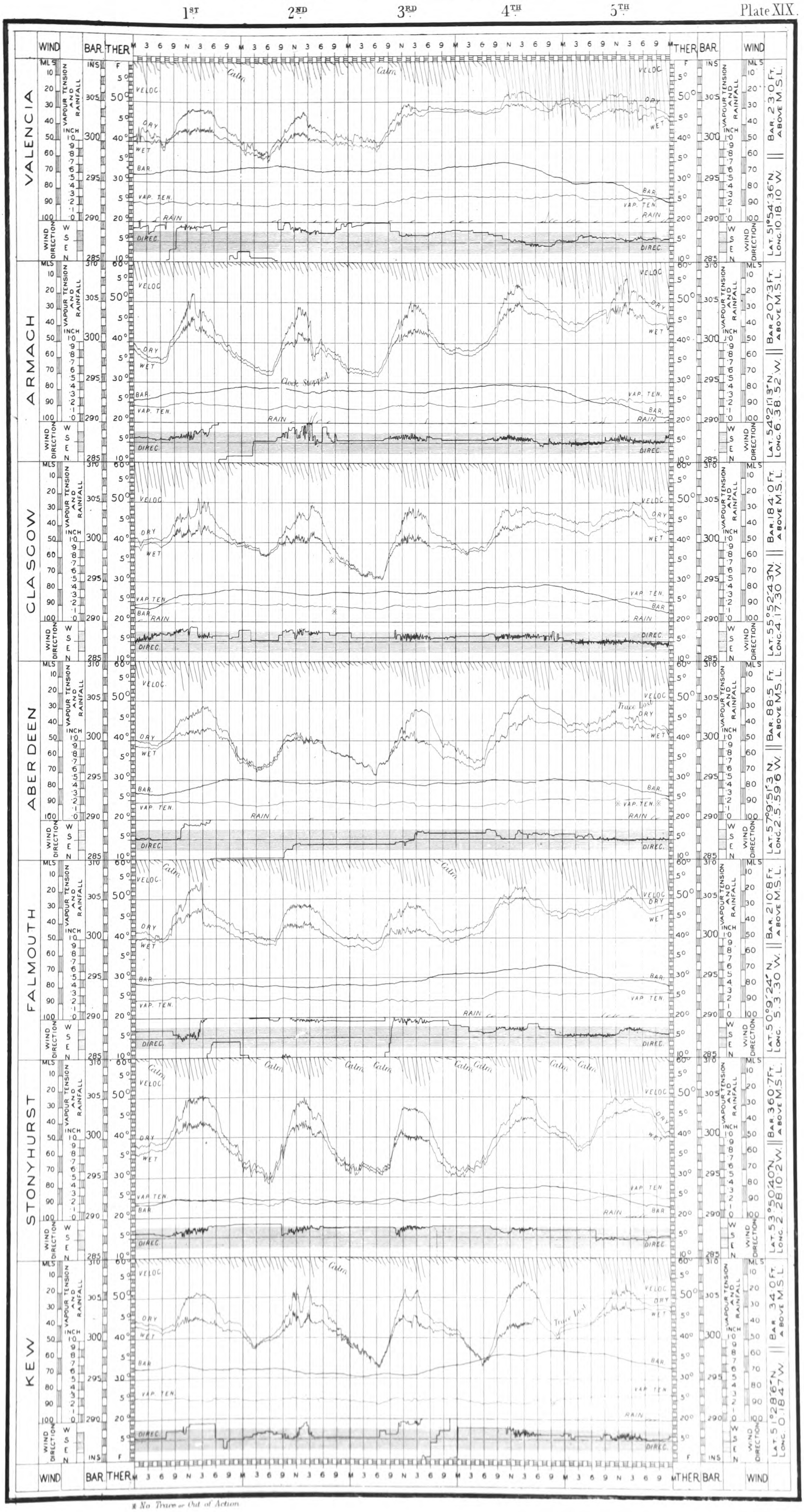
Plate XVIII



※ No Trace or Out of Action

APRIL — 1879.

Plate XIX.

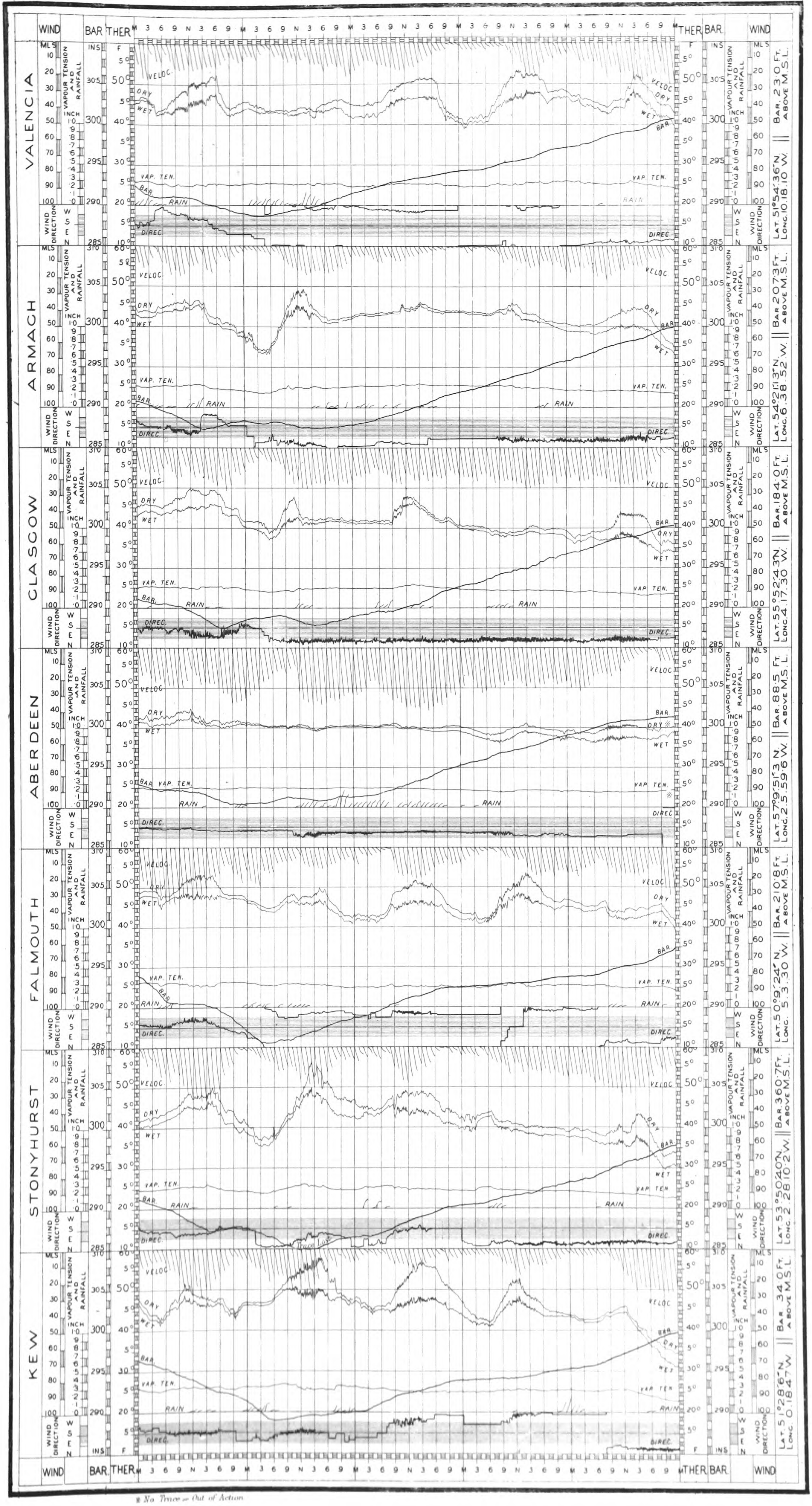


× No Trace or Out of Action.

APRIL — 1879

6th. 7th. 8th. 9th. 10th.

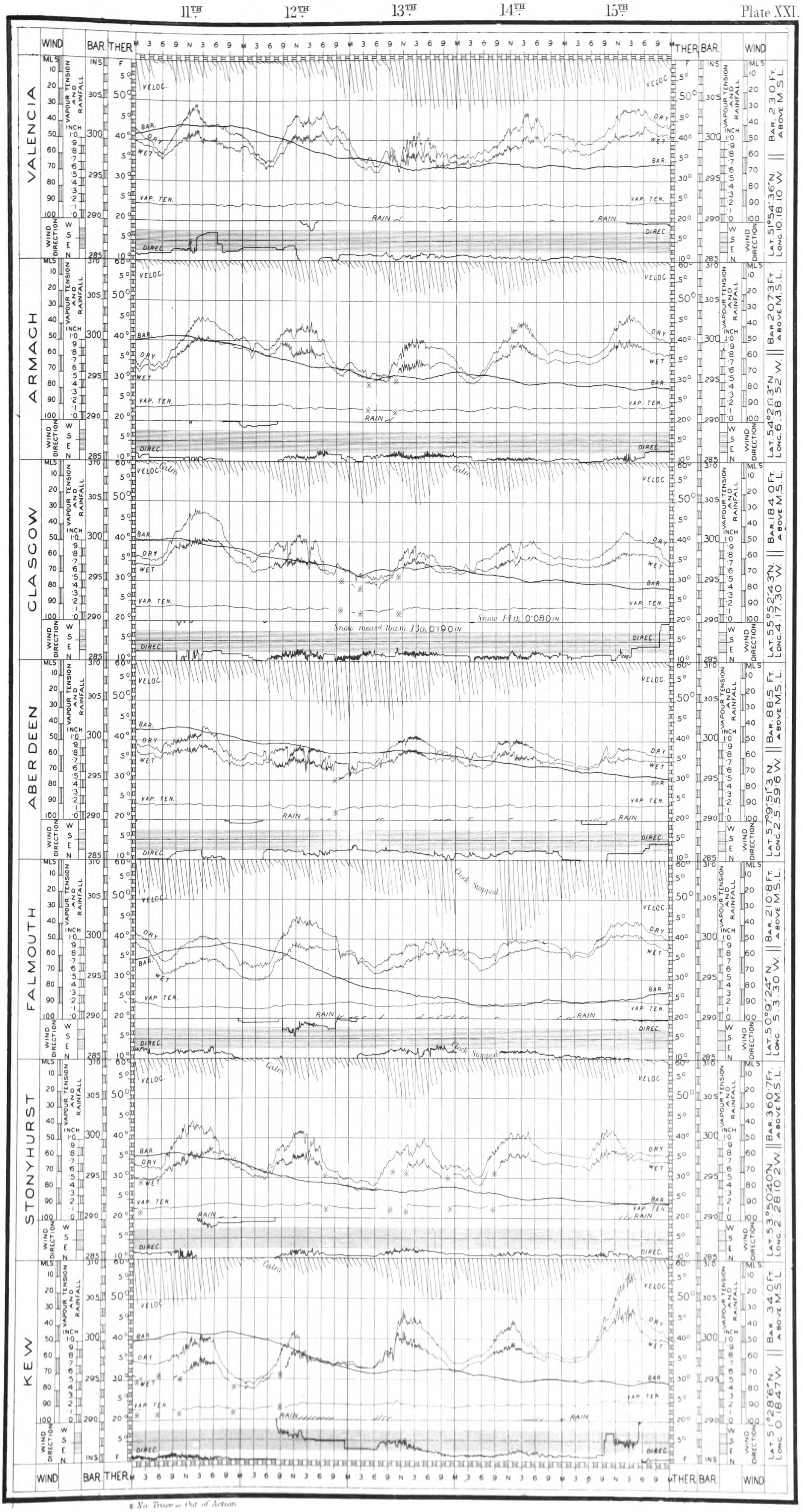
Plate XX.



* No Trace or Out of Action

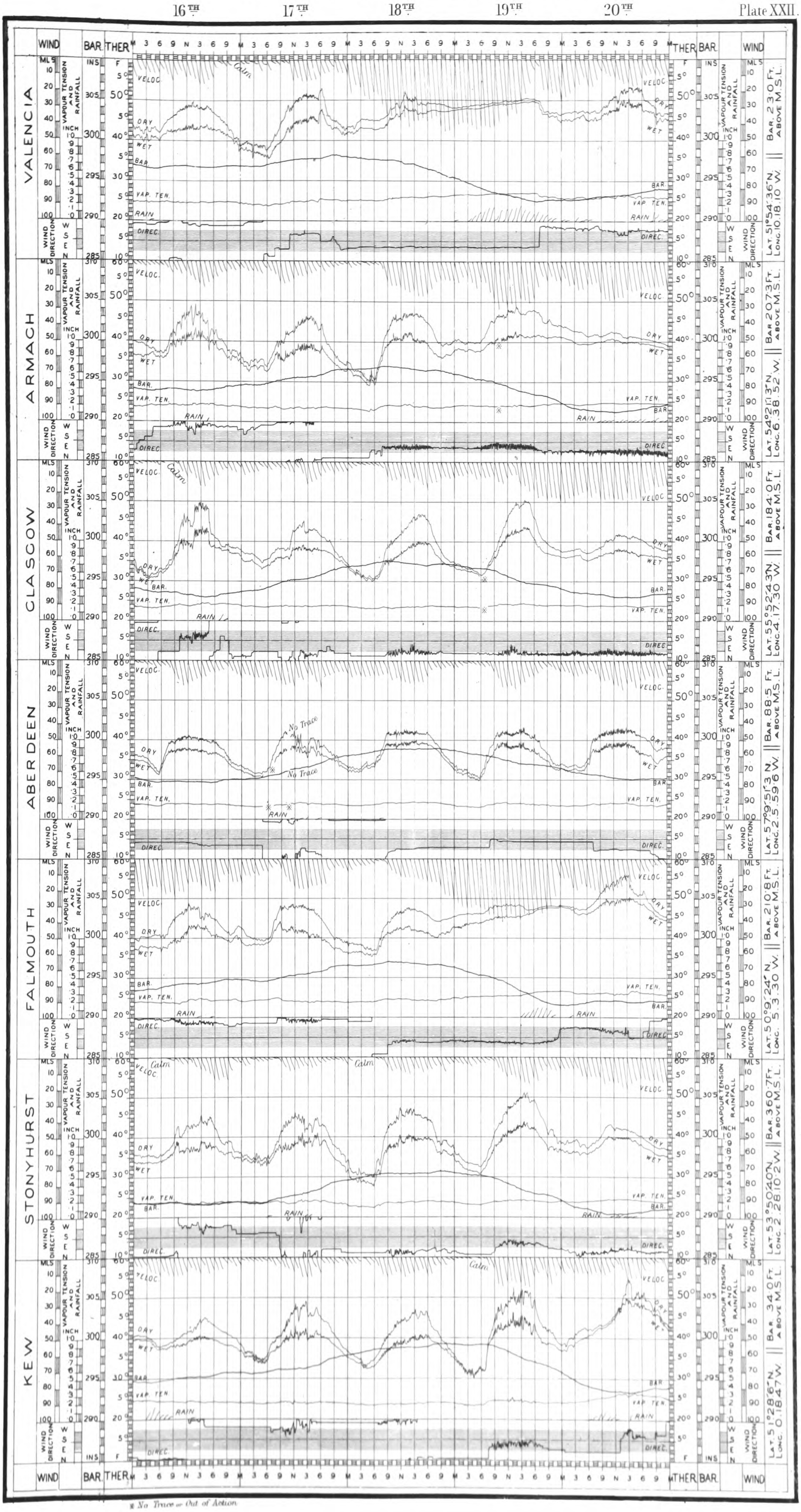
A P R I L — 1 8 7 9.

Plate XXI.



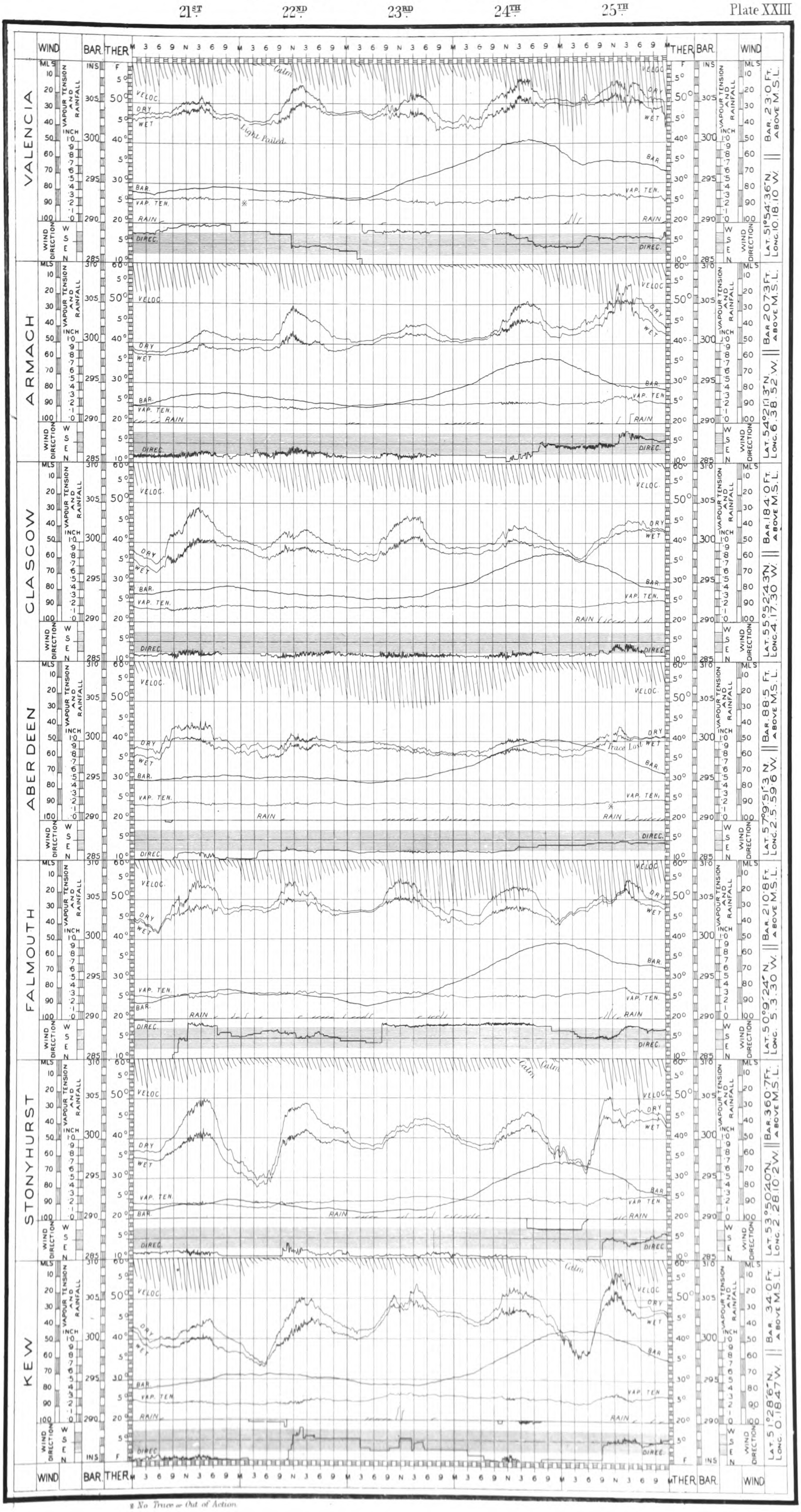
✱ No Trace or Out of Action

APRIL — 1879.



* No Trace = Out of Action

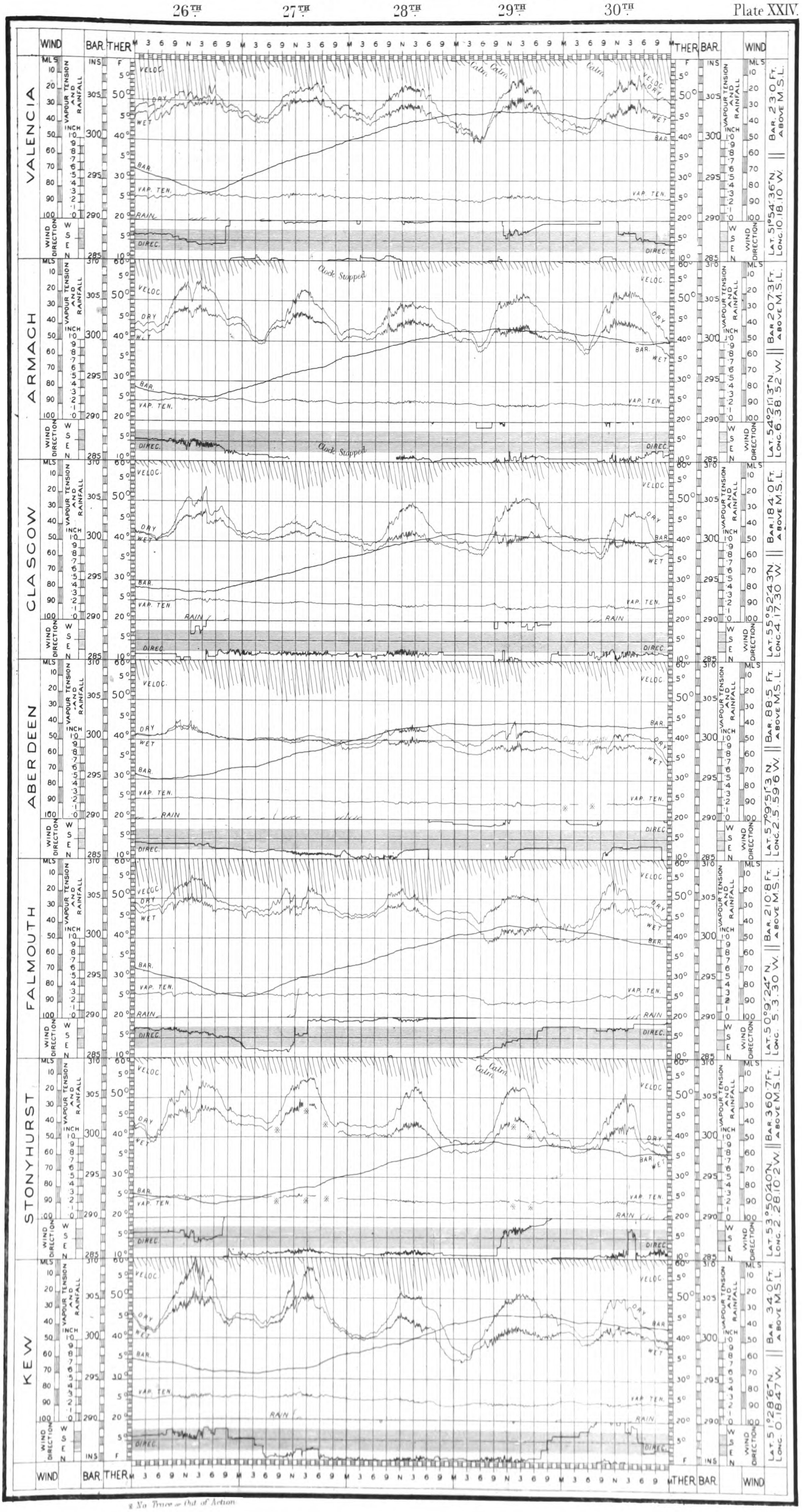
APRIL — 1879.



* No Trace or Out of Action.

APRIL — 1879.

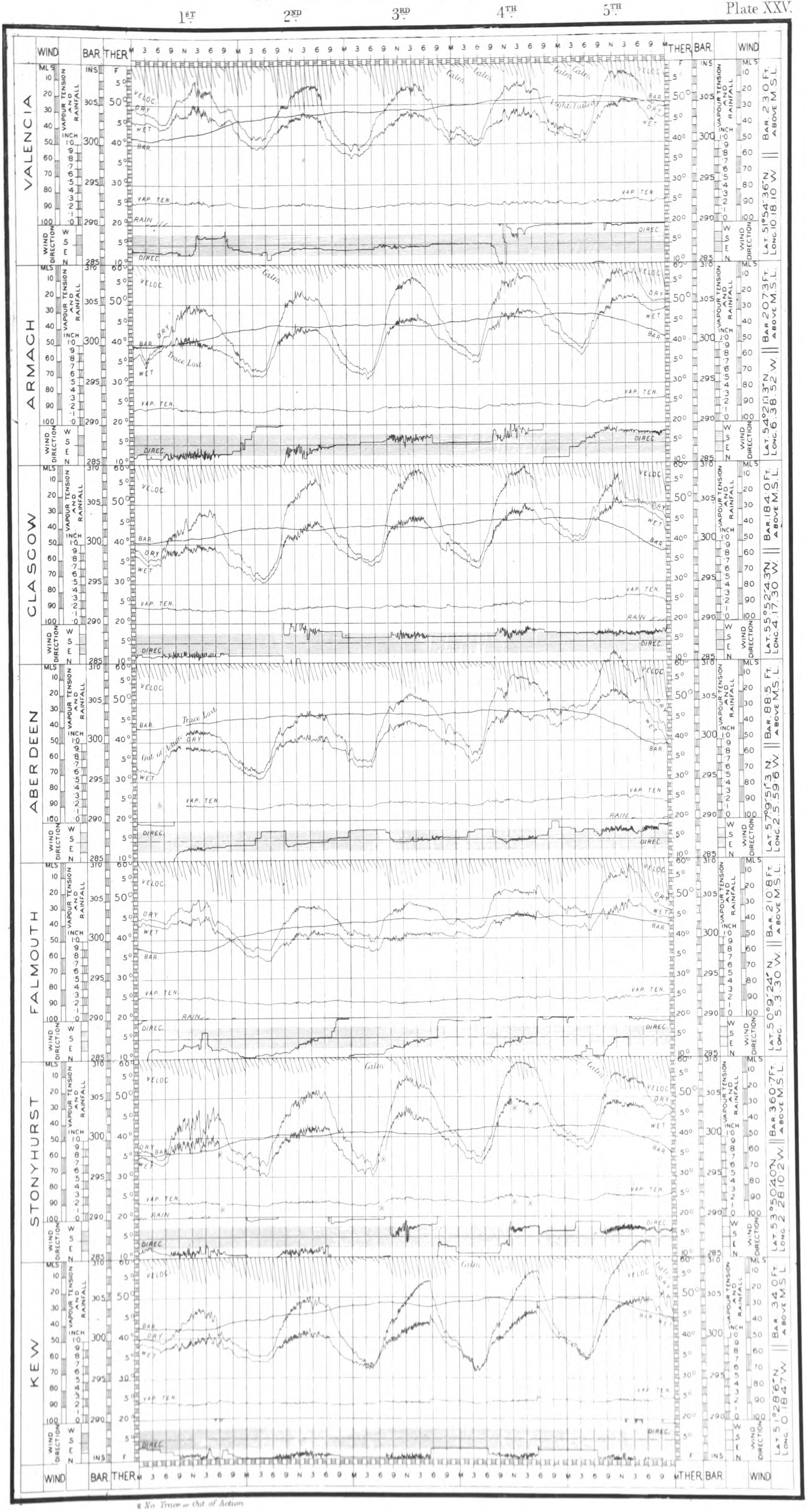
Plate XXIV.



* No Trace or Out of Action

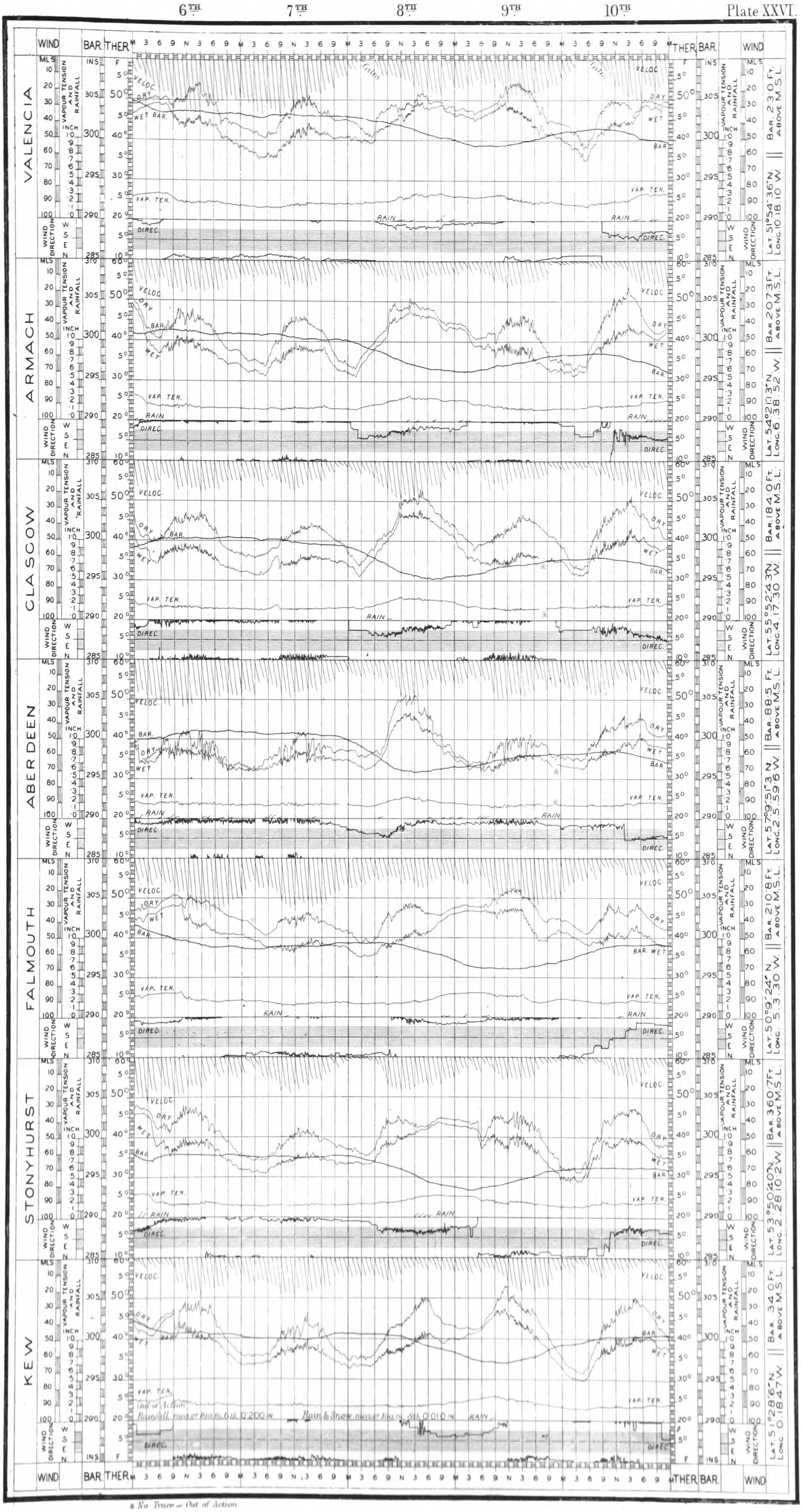
MAY —— 1879.

Plate XXV.



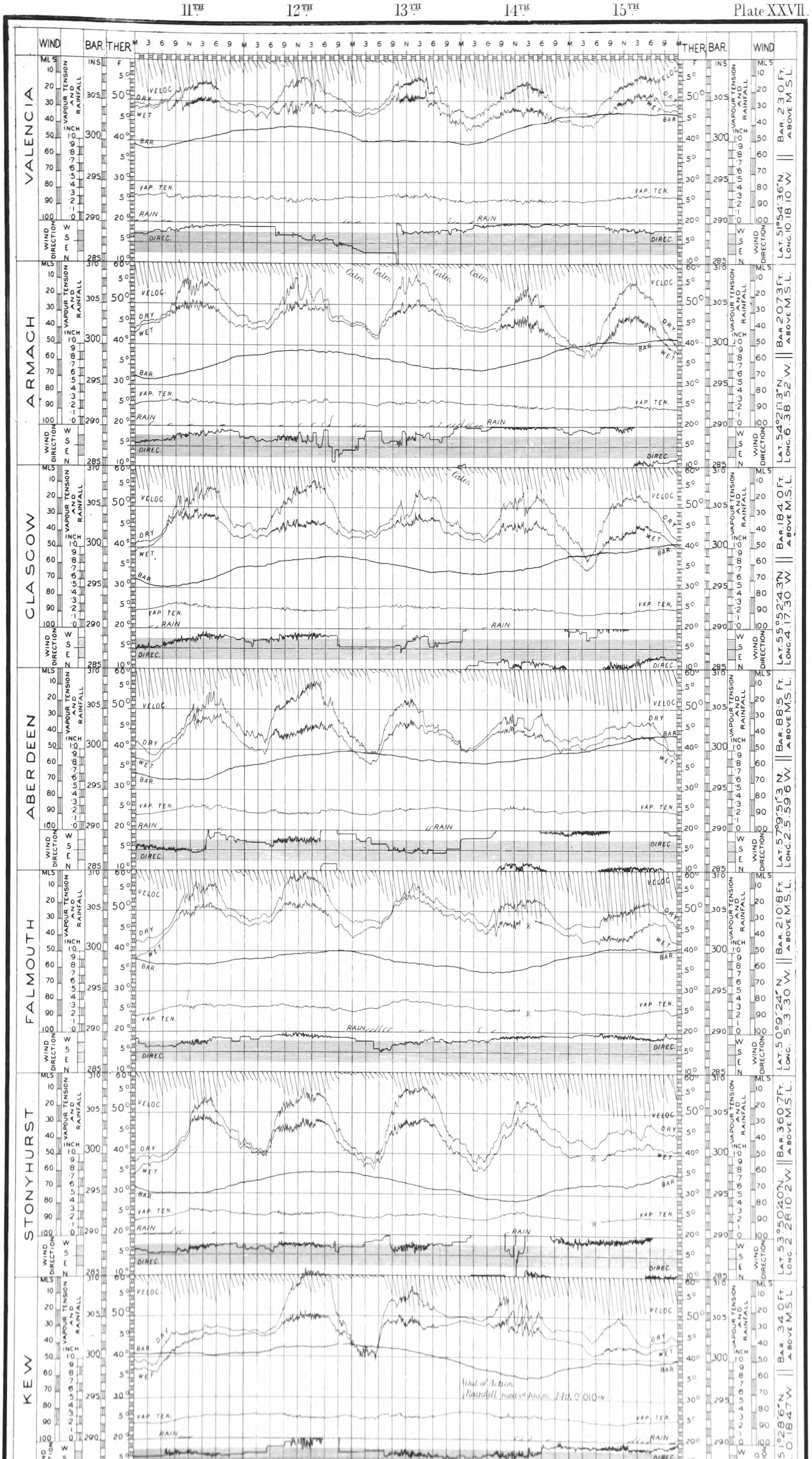
* No Trace or Out of Action.

MAY — 1879.



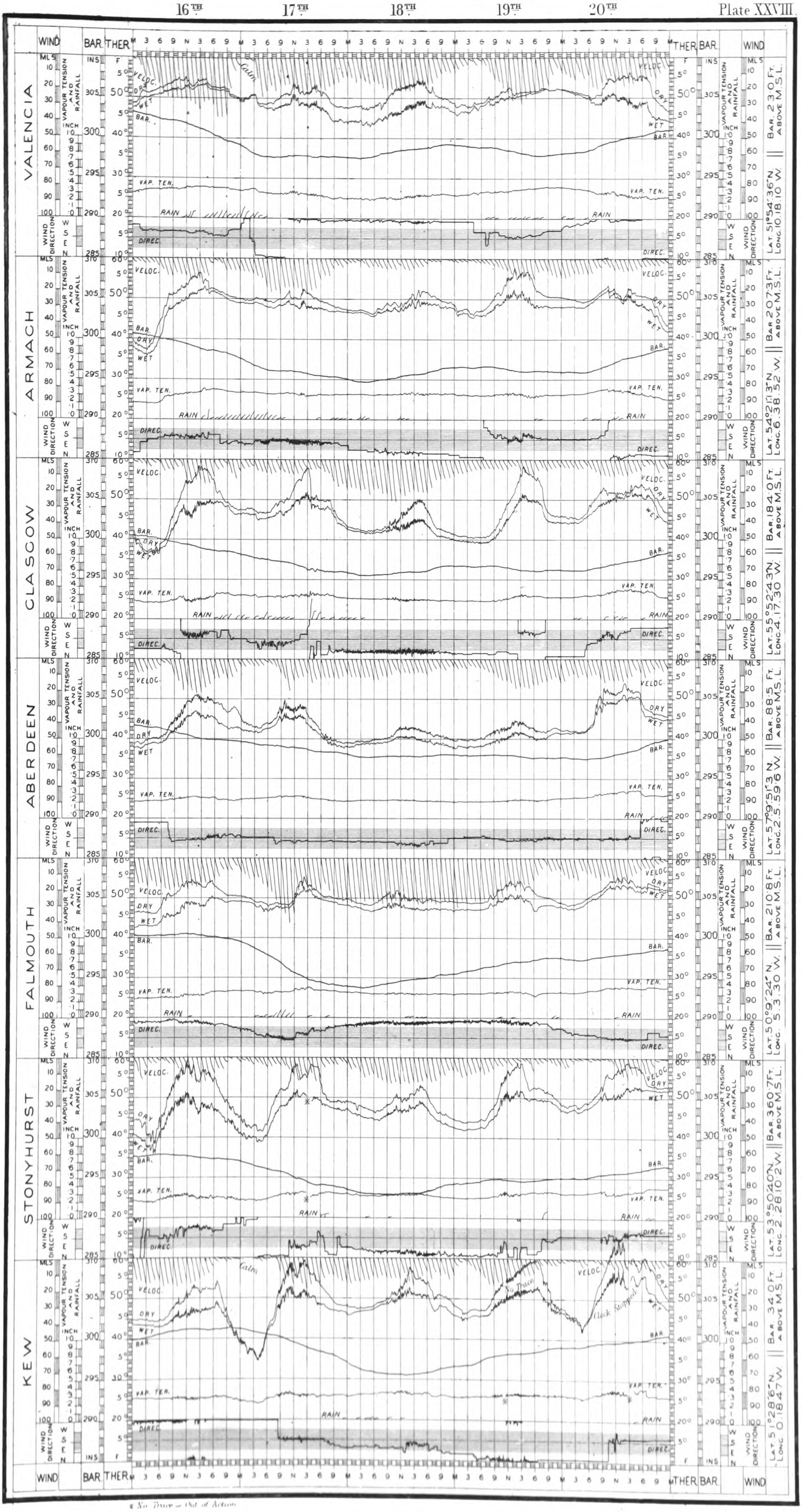
× No Trace = Out of Action

MAY — 1879.



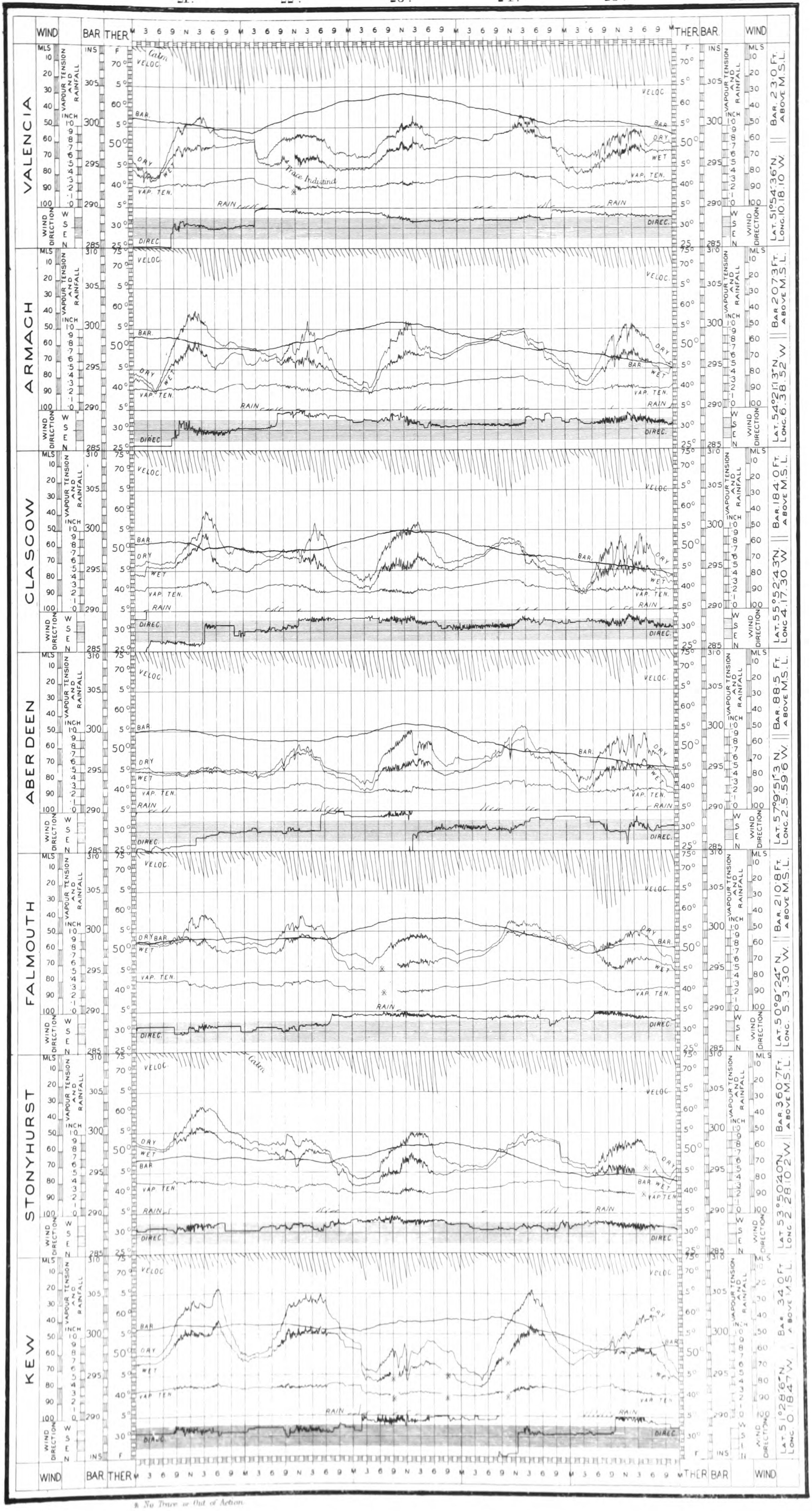
* No Trace or Out of Action

MAY — 1879.



* No Trace = Out of Action

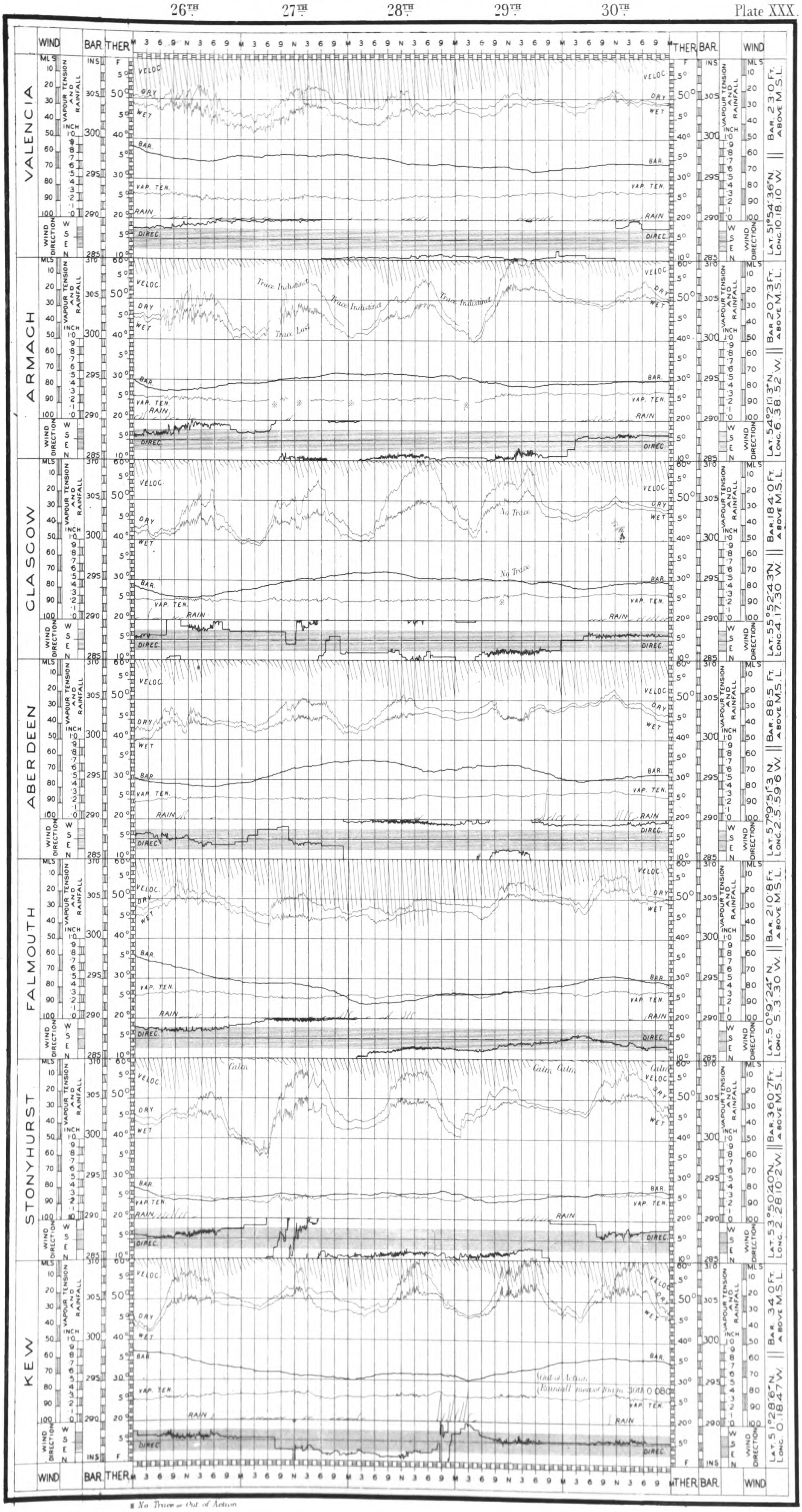
MAY — 1879.



* No Trace or Out of Action.

MAY ——— 1879.

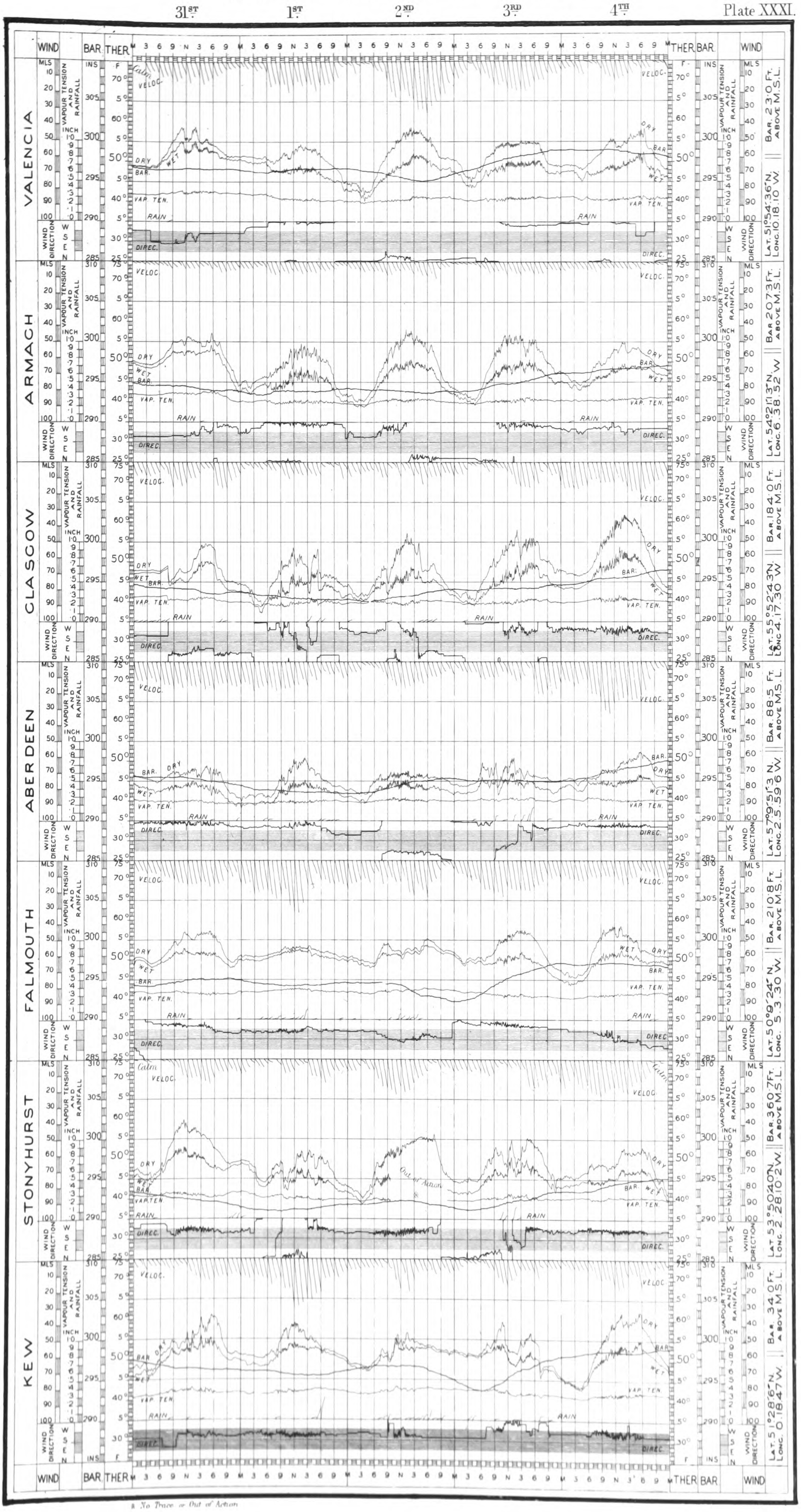
Plate XXX.



* No Trace or Out of Action

MAY — JUNE — 1879.

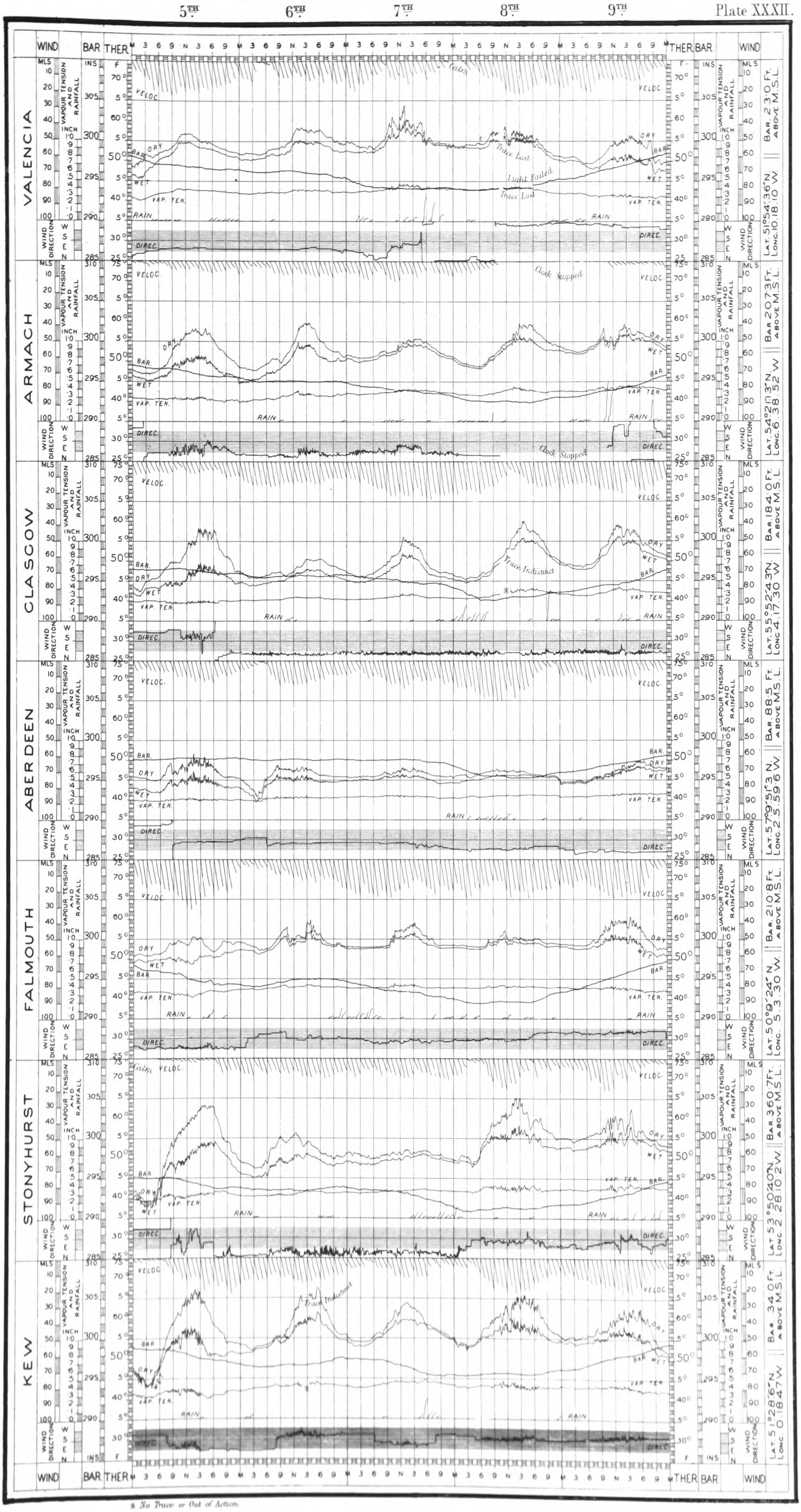
Plate XXXI.



* No Trace or Out of Action

JUNE — 1879.

5th. 6th. 7th. 8th. 9th. Plate XXXII.

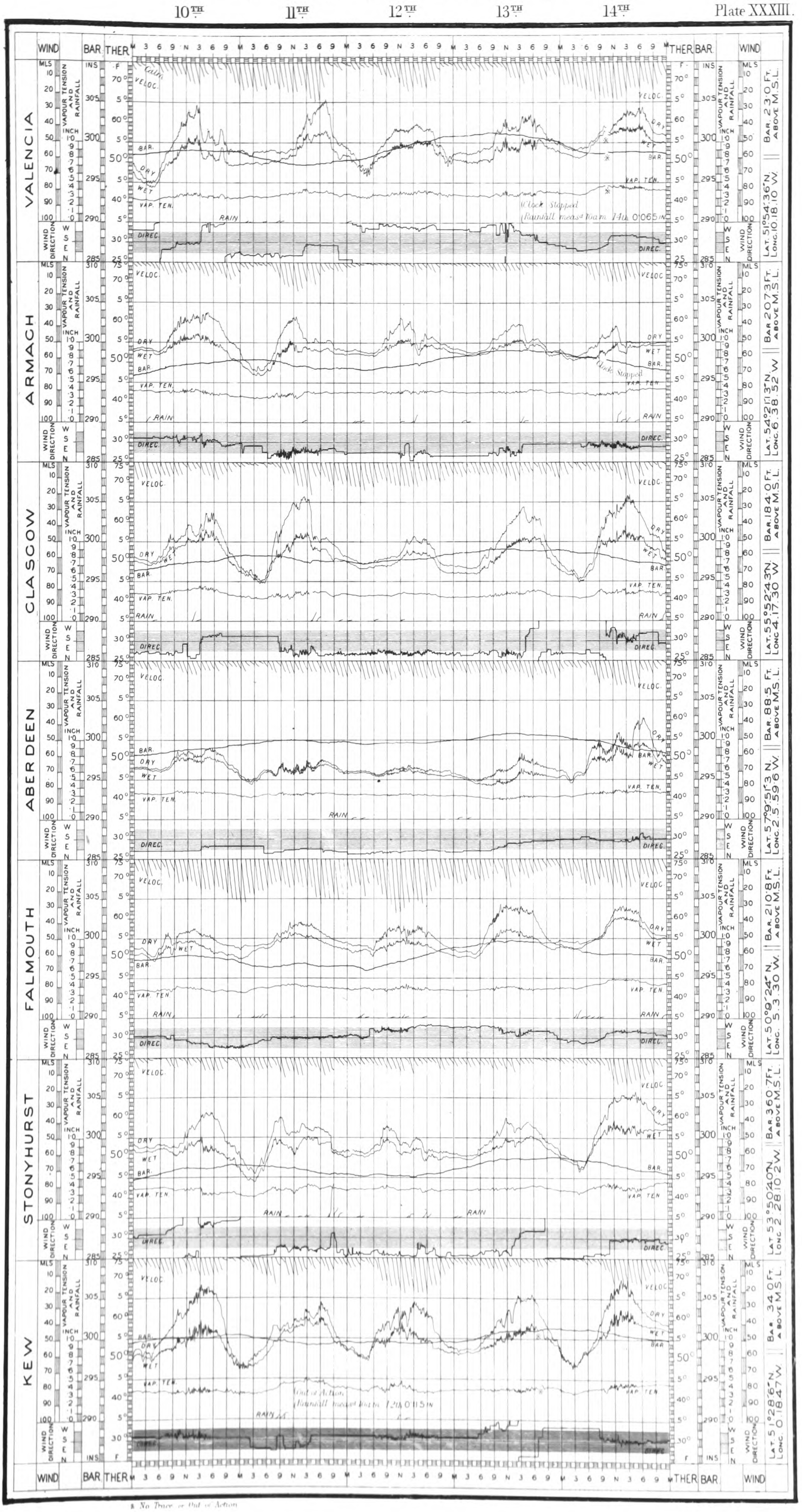


* No Trace or Out of Action.

JUNE —— 1879.

10th 11th 12th 13th 14th

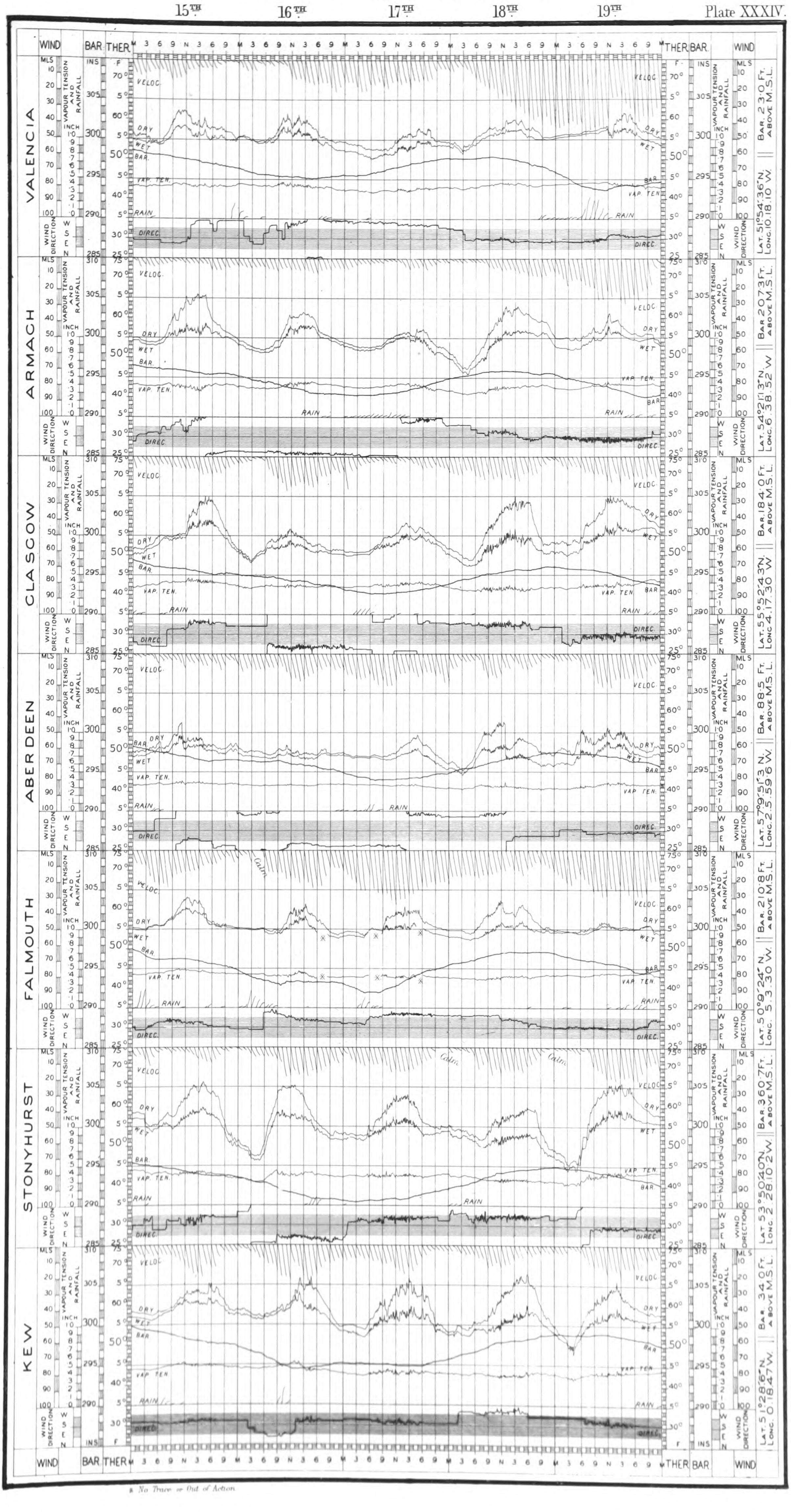
Plate XXXIII.



* No Trace or Out of Action

JUNE —— 1879.

Plate XXXIV.

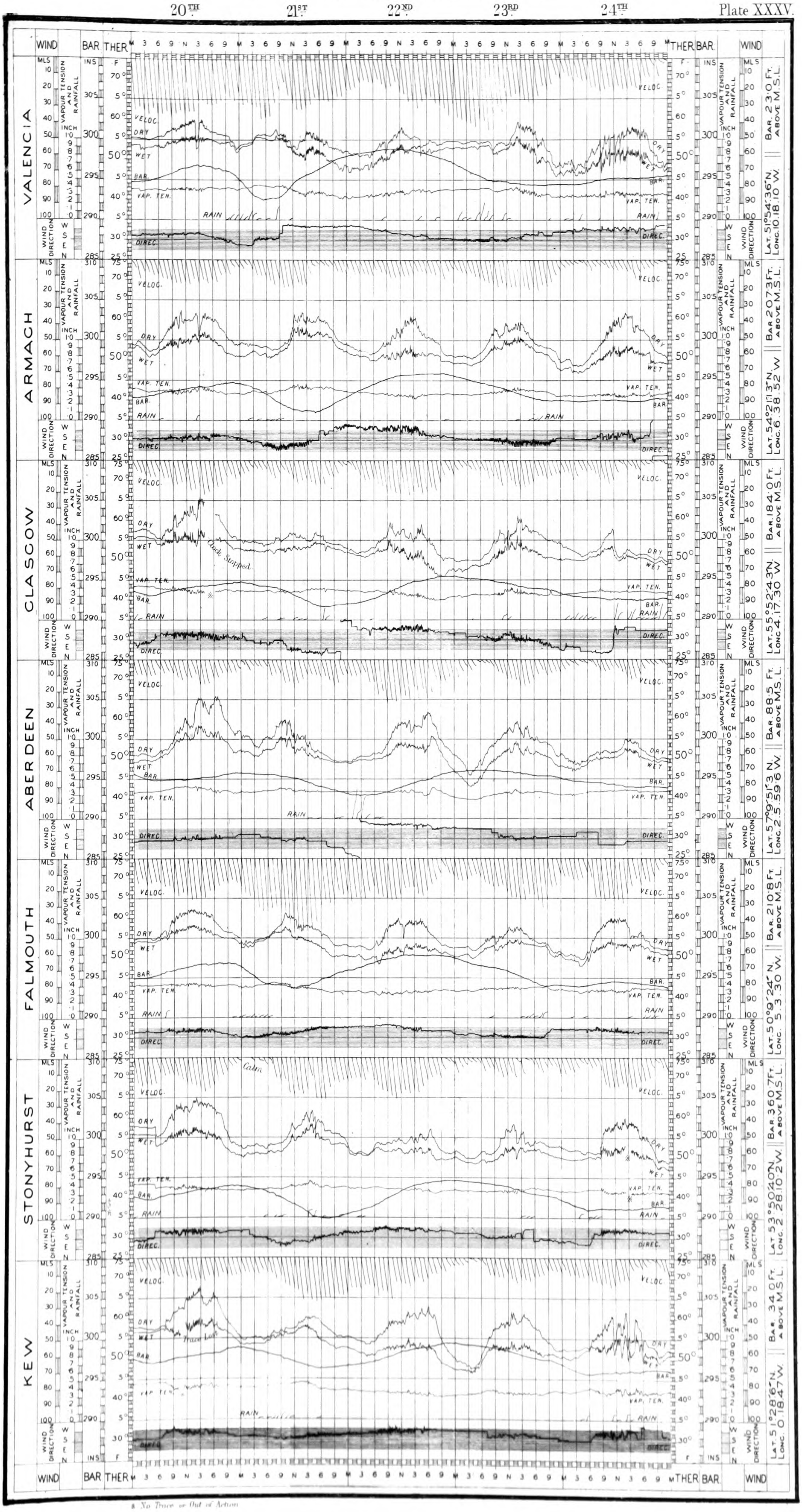


* No Trace or Out of Action

JUNE — 1879.

20TH 21ST 22ND 23RD 24TH

Plate XXXV.

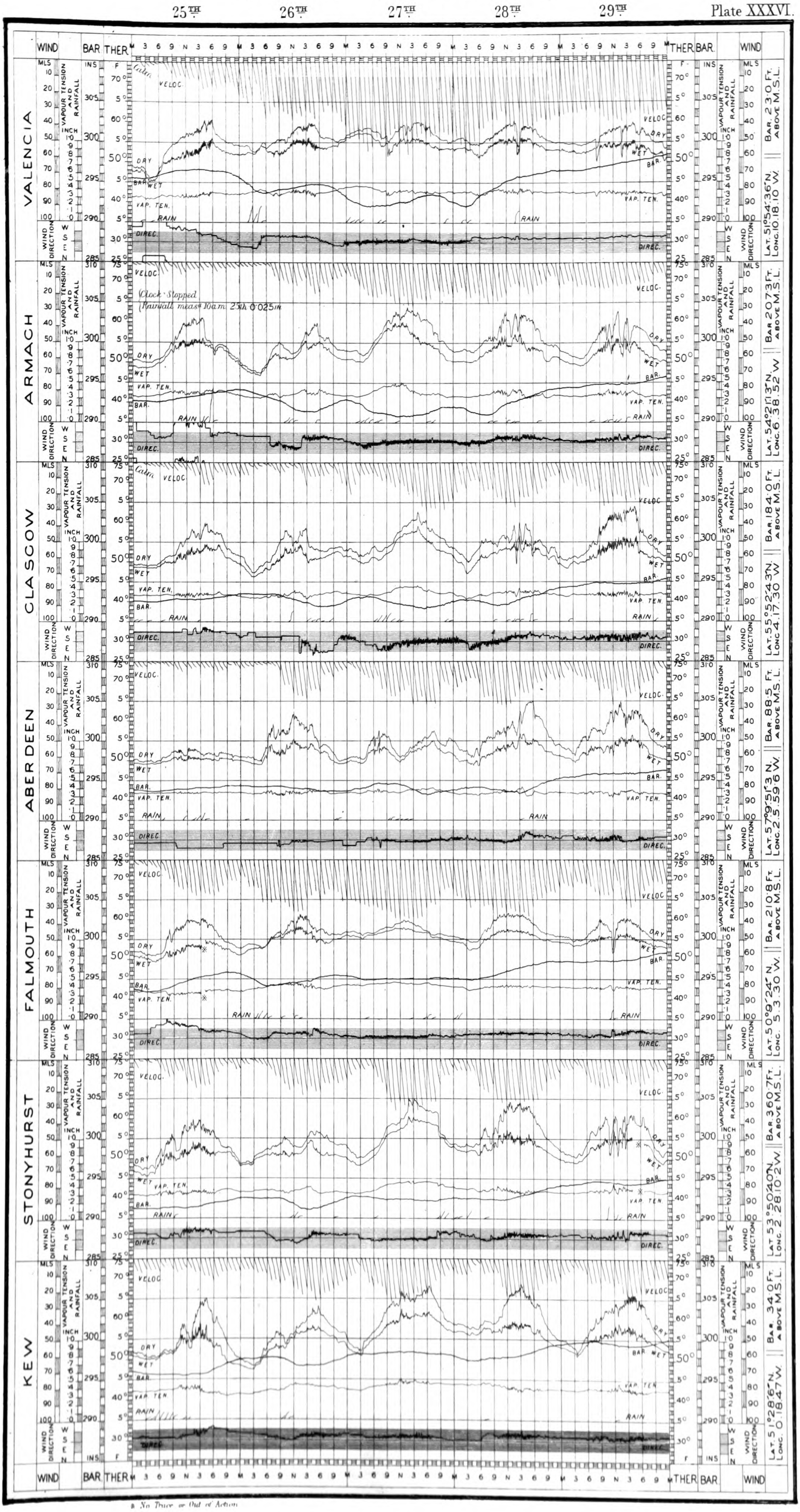


* No Trace or Out of Action

JUNE —— 1879.

25th 26th 27th 28th 29th

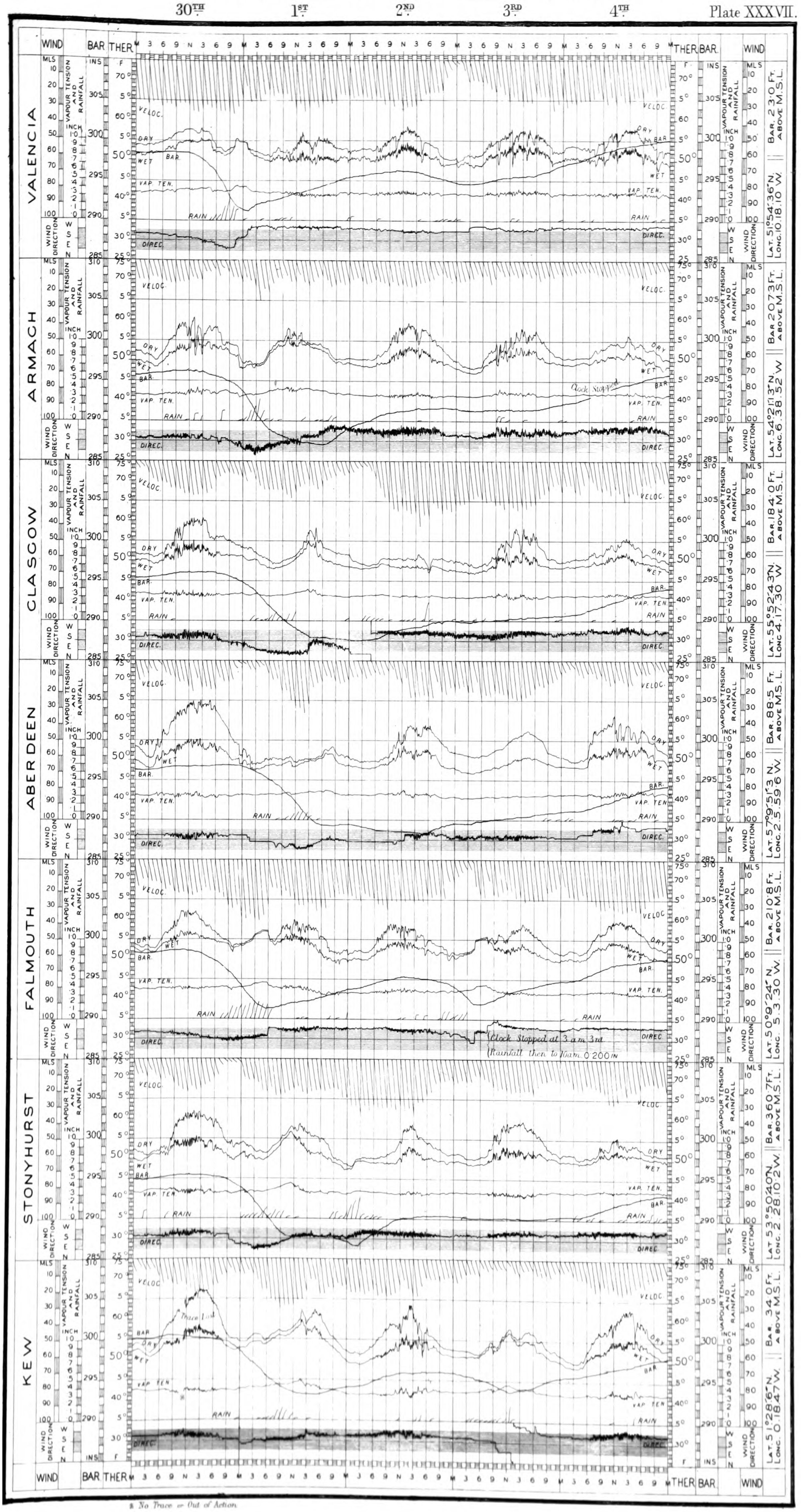
Plate XXXVI.



* No Trace or Out of Action

JUNE — JULY — 1879.

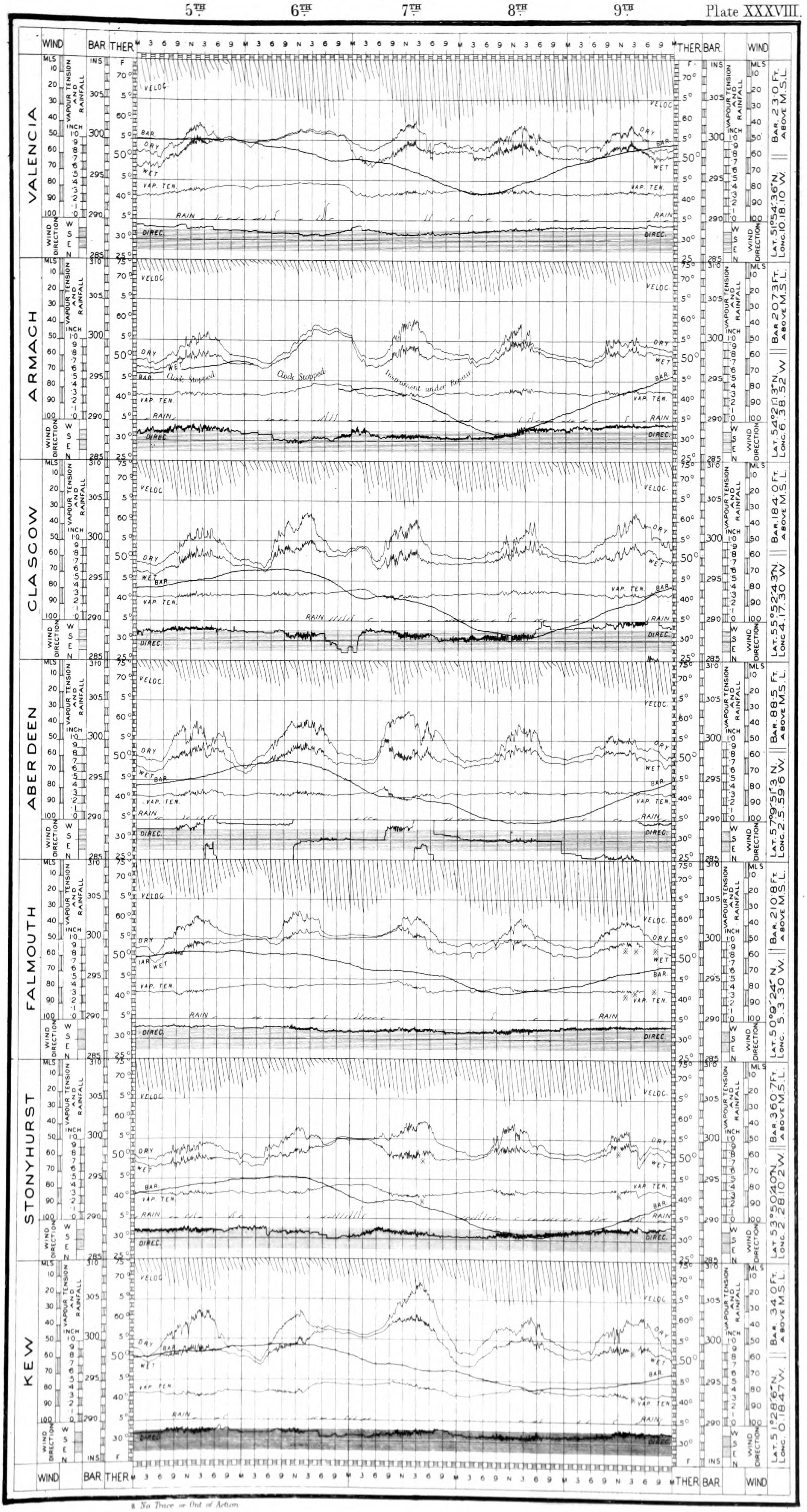
Plate XXXVII.



* No Trace or Out of Action.

J U L Y ——— 1 8 7 9.

Plate XXXVIII.

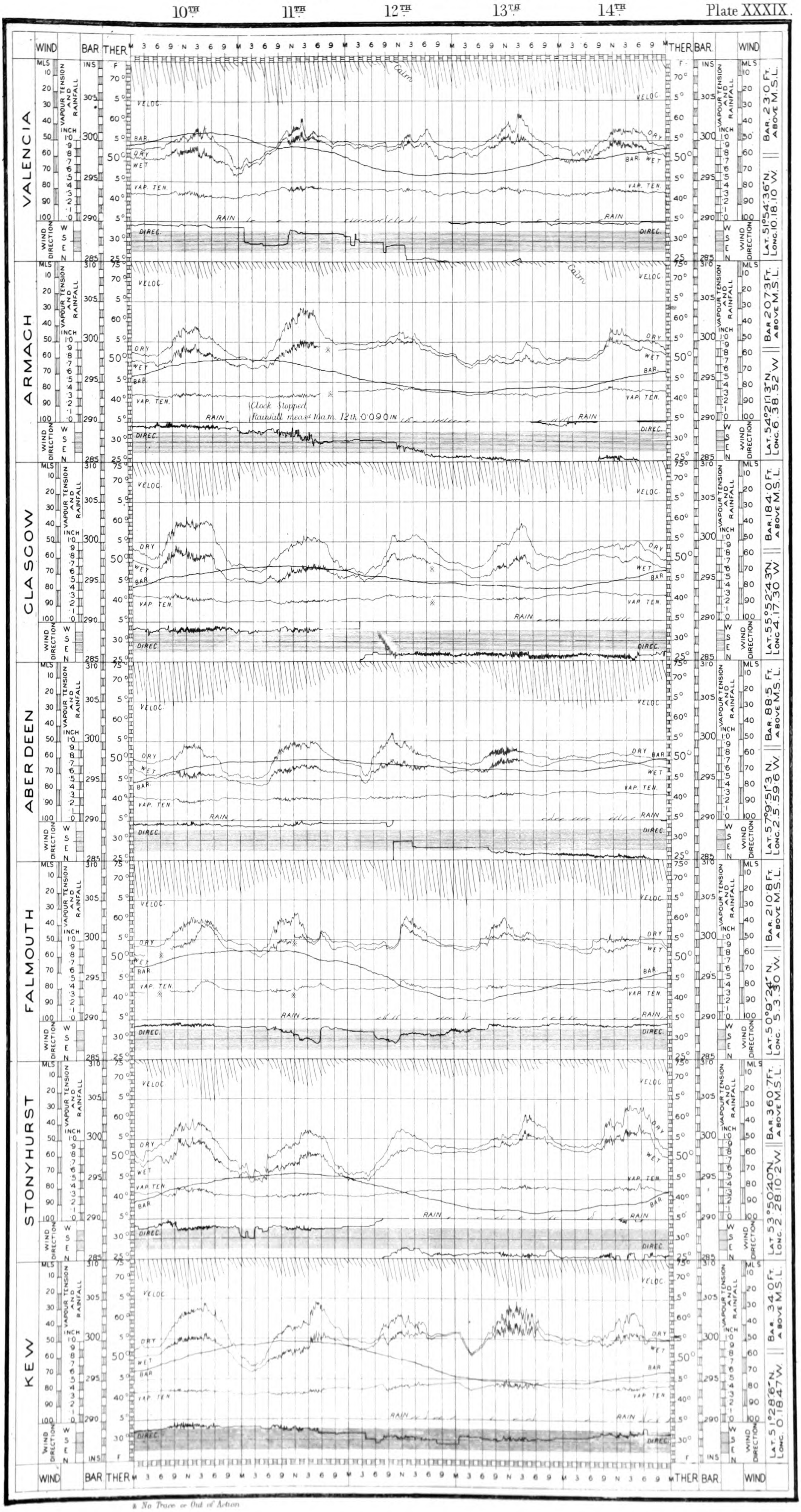


✱ No Trace or Out of Action

J U L Y — 1 8 7 9.

10th 11th 12th 13th 14th

Plate XXXIX.

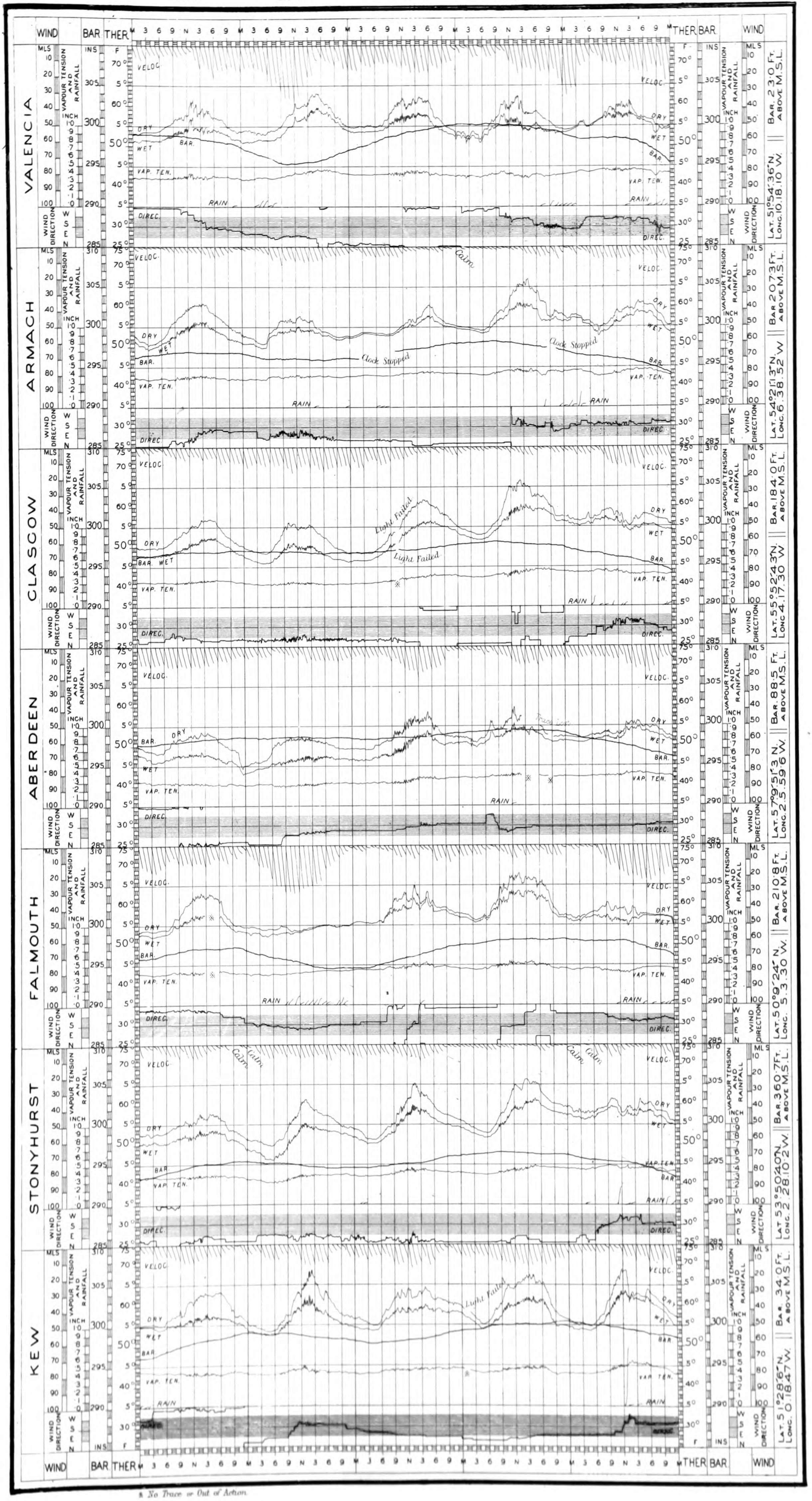


※ No Trace or Out of Action

JULY —— 1879.

Plate XL.

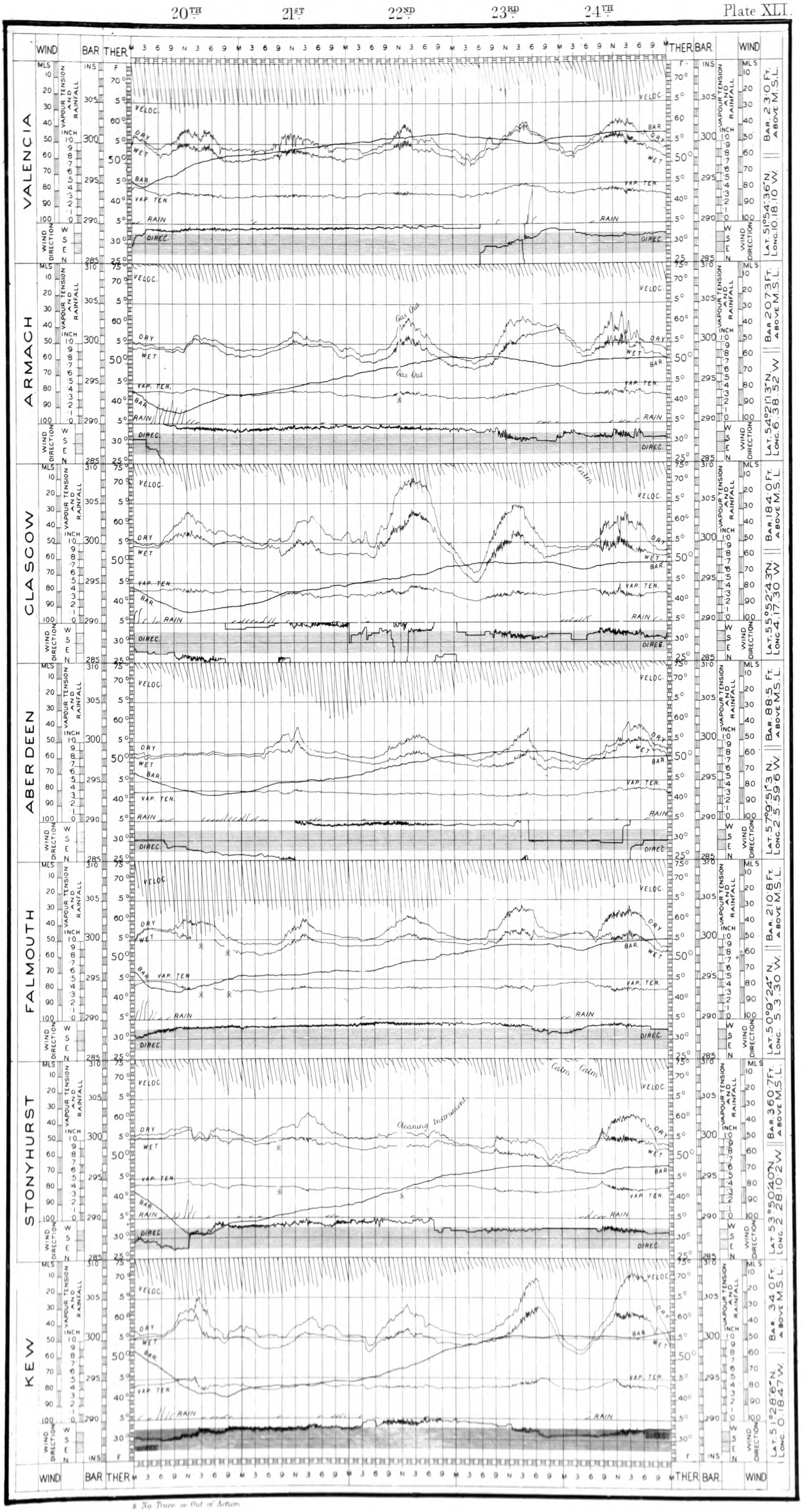
15th 16th 17th 18th 19th



* No Trace or Out of Action.

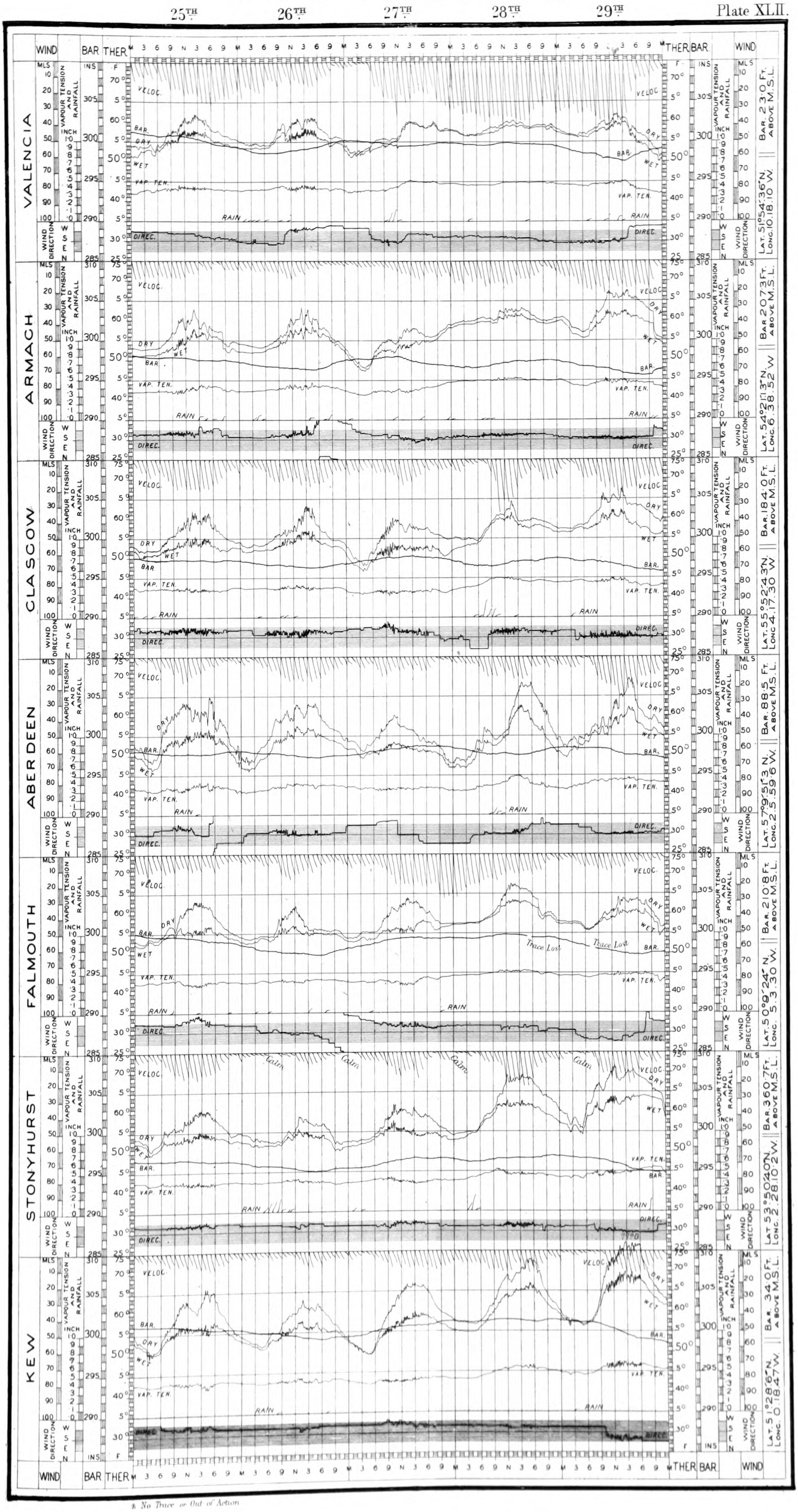
JULY —— 1879.

Plate XLI.



* No Trace or Out of Action

JULY 1879. Plate XLII.

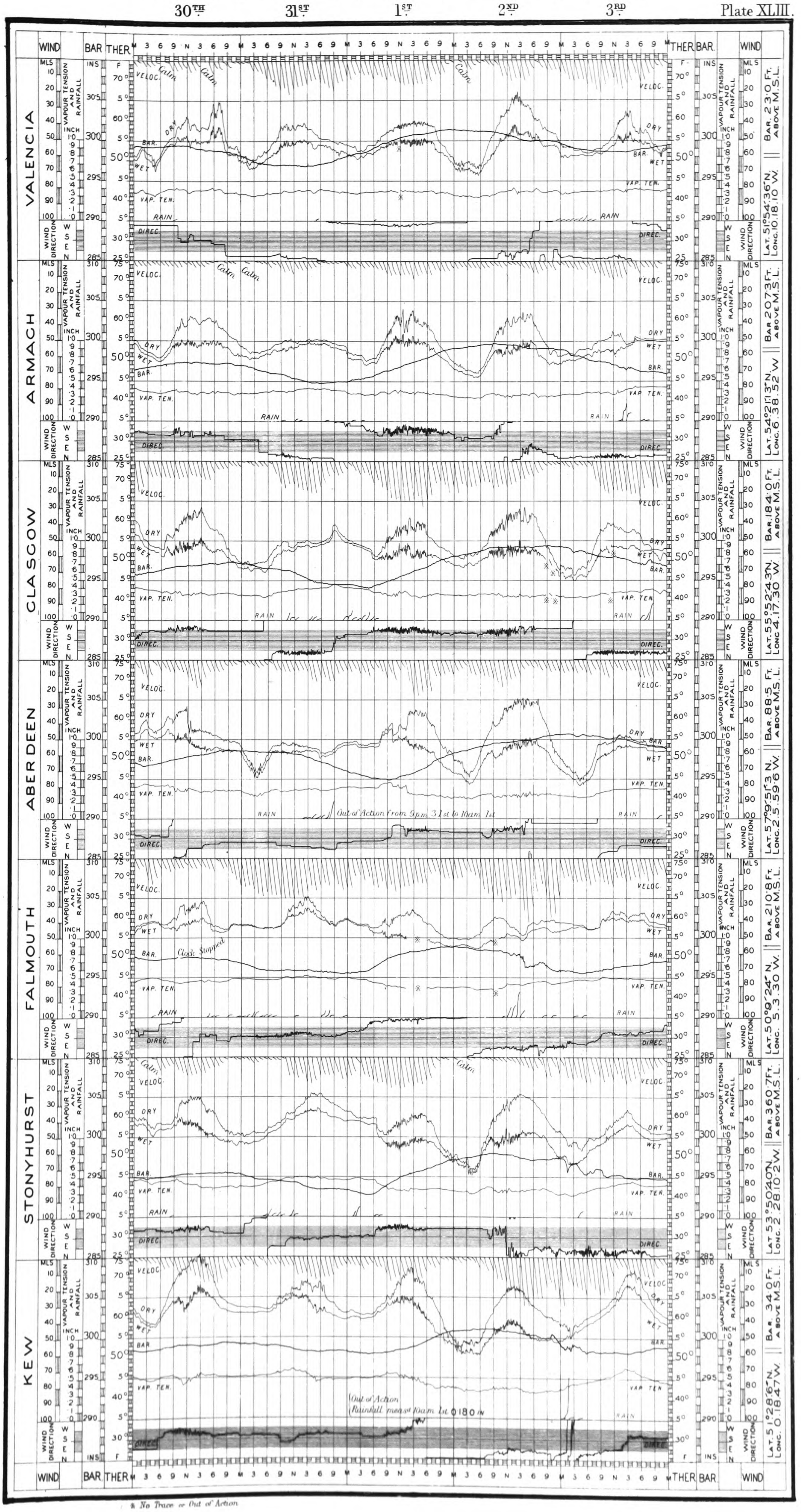


* No Trace or Out of Action

JULY — AUGUST — 1879.

30th 31st 1st 2nd 3rd

Plate XLIII.

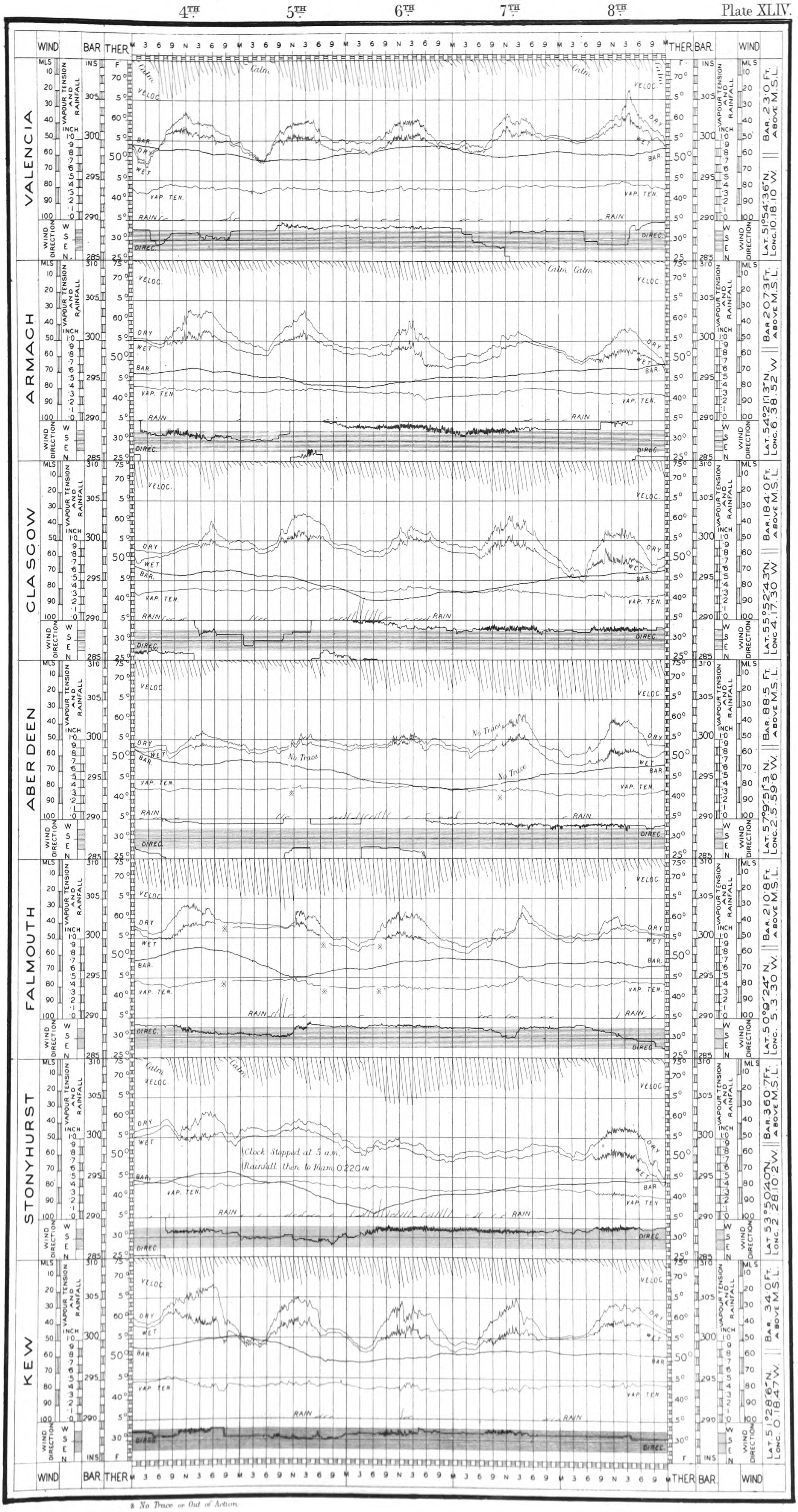


* No Trace or Out of Action

AUGUST —— 1879.

4TH 5TH 6TH 7TH 8TH

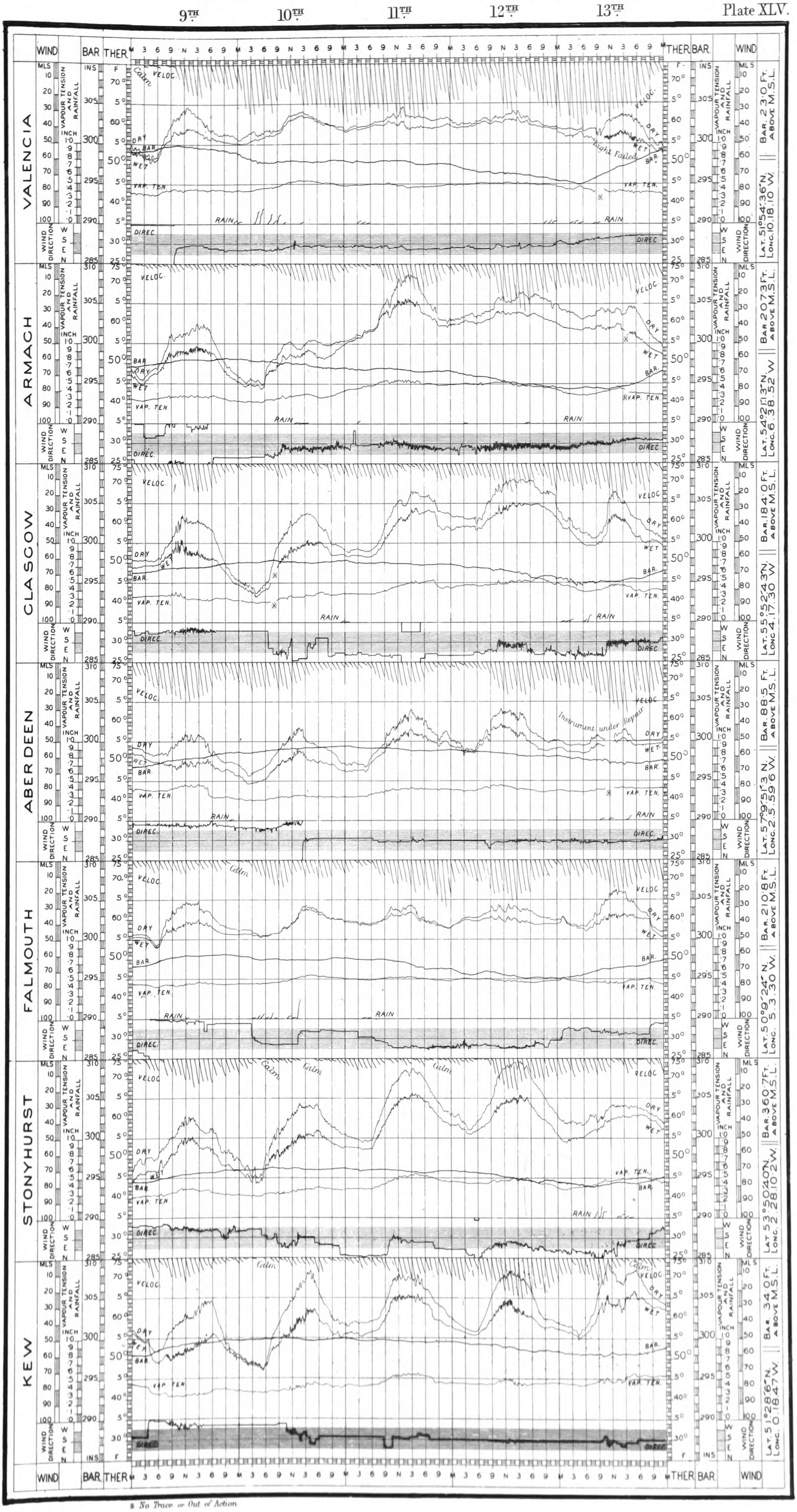
Plate XLIV.



* No Trace or Out of Action

AUGUST ——— 1879.

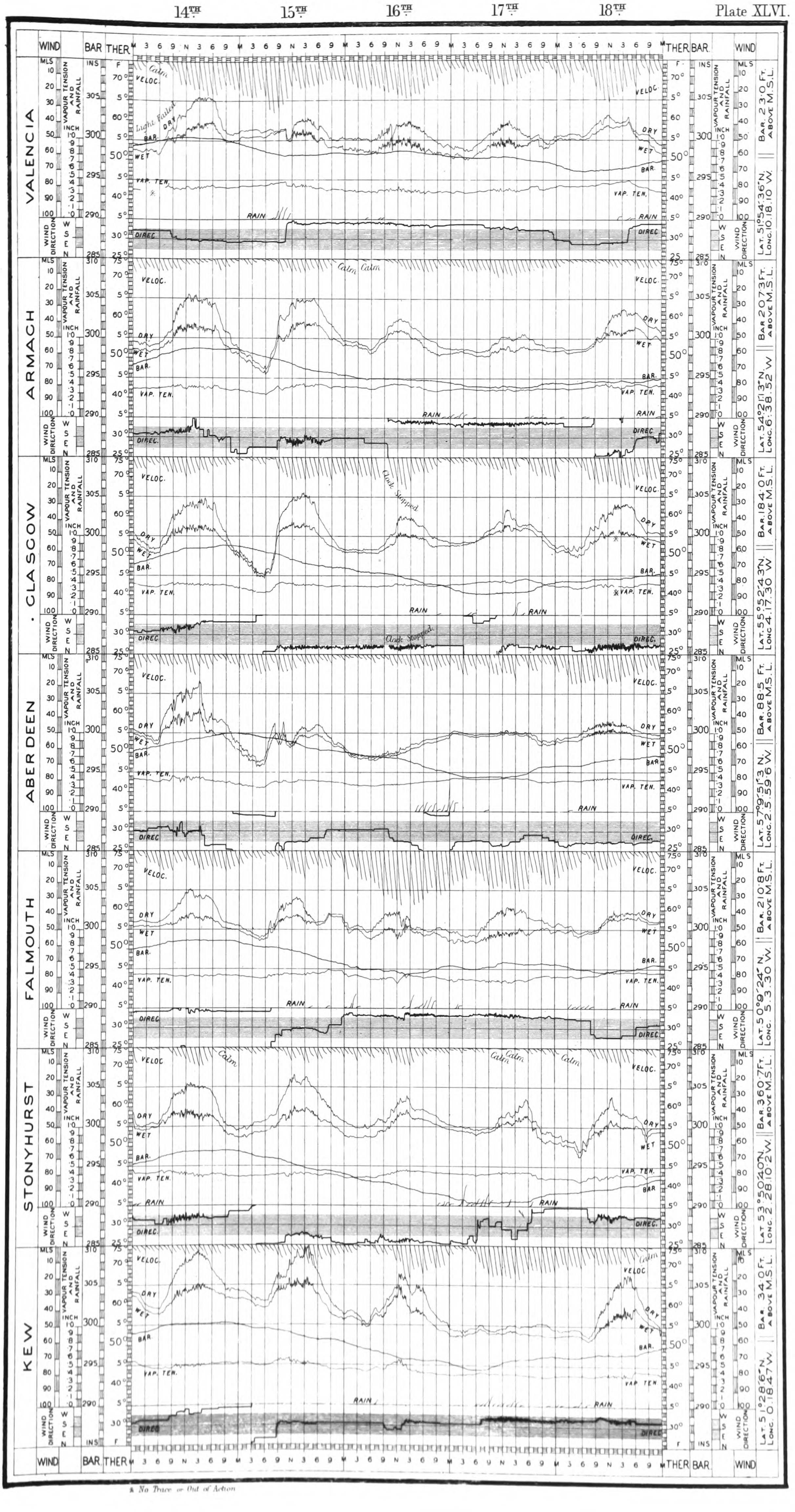
Plate XLV.



× No Trace or Out of Action

AUGUST — 1879.

Plate XLVI.



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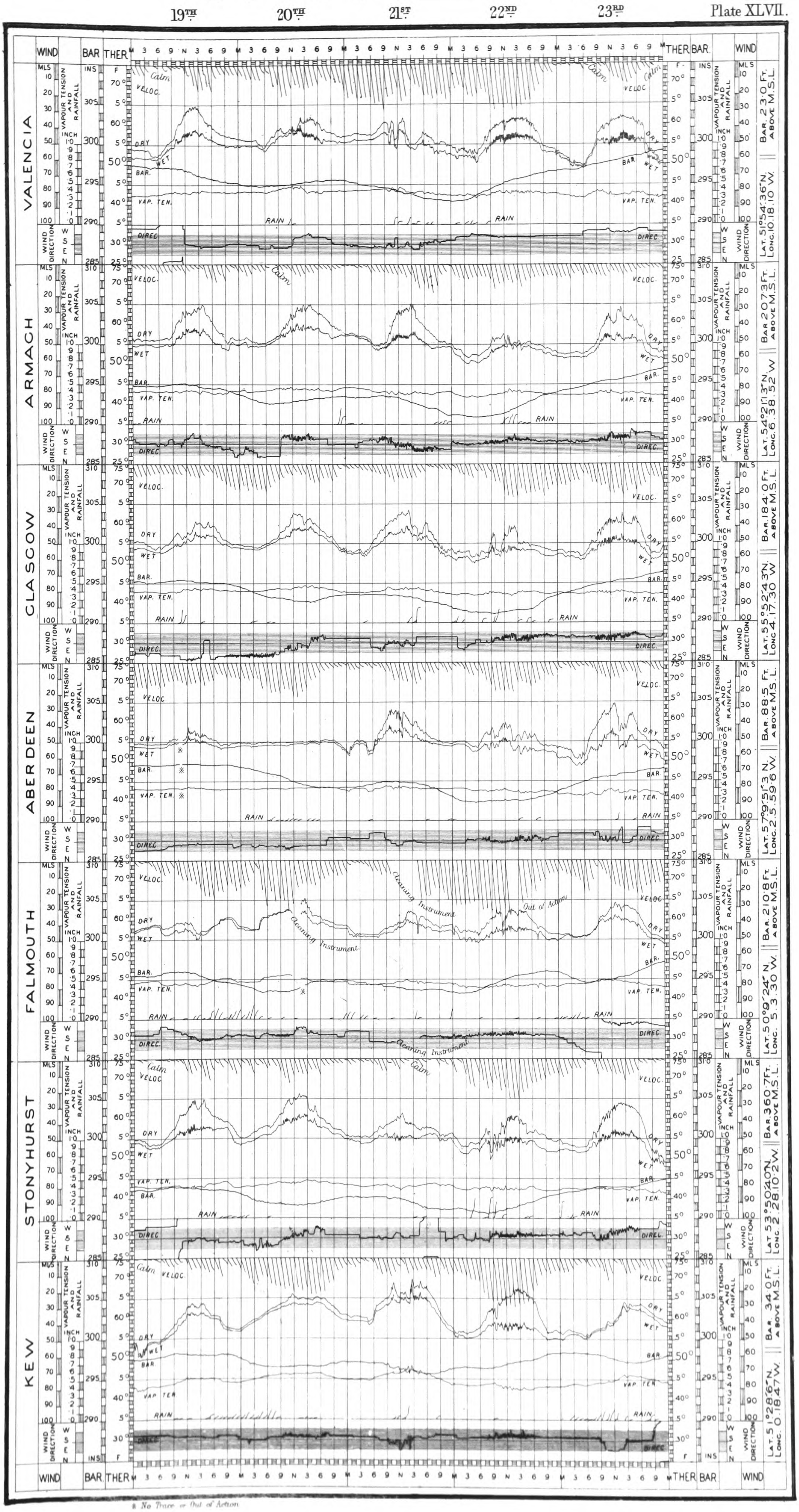
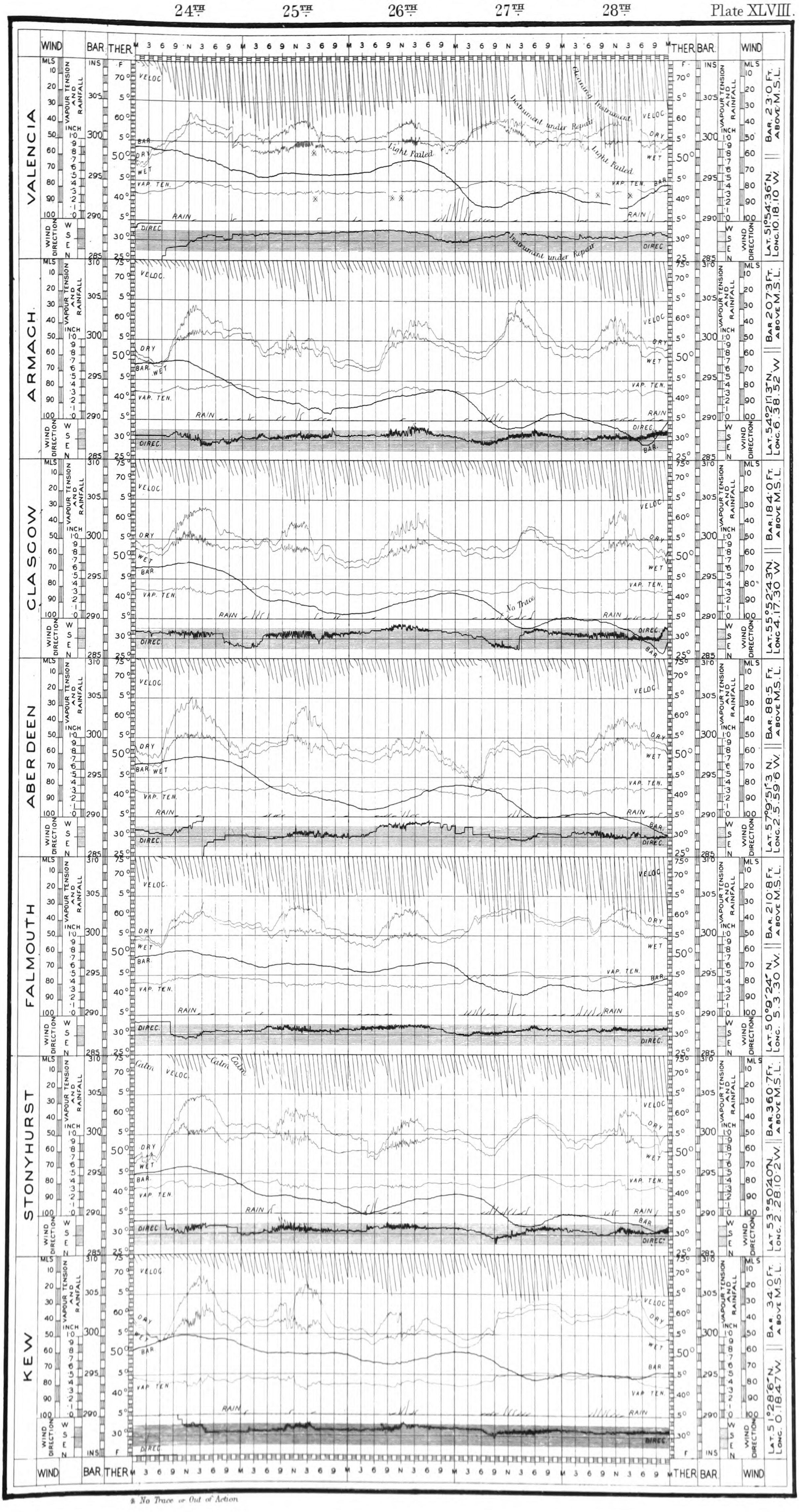
AUGUST —— 1879.



* No Trace or Out of Action

AUGUST ——— 1879.

24th 25th 26th 27th 28th Plate XLVIII.

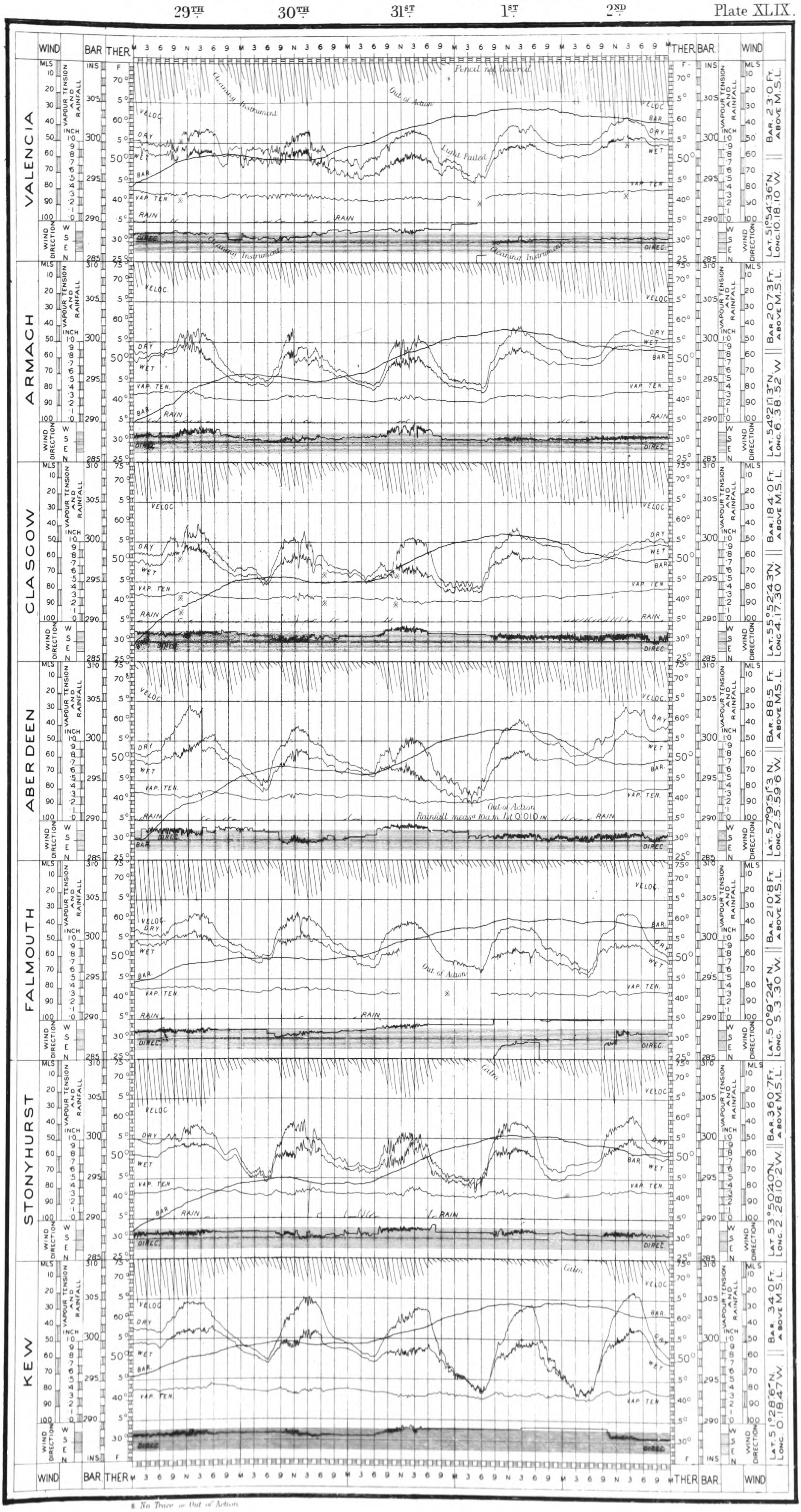


✻ No Trace or Out of Action

AUGUST — SEPTEMBER — 1879.

29TH 30TH 31ST 1ST 2ND

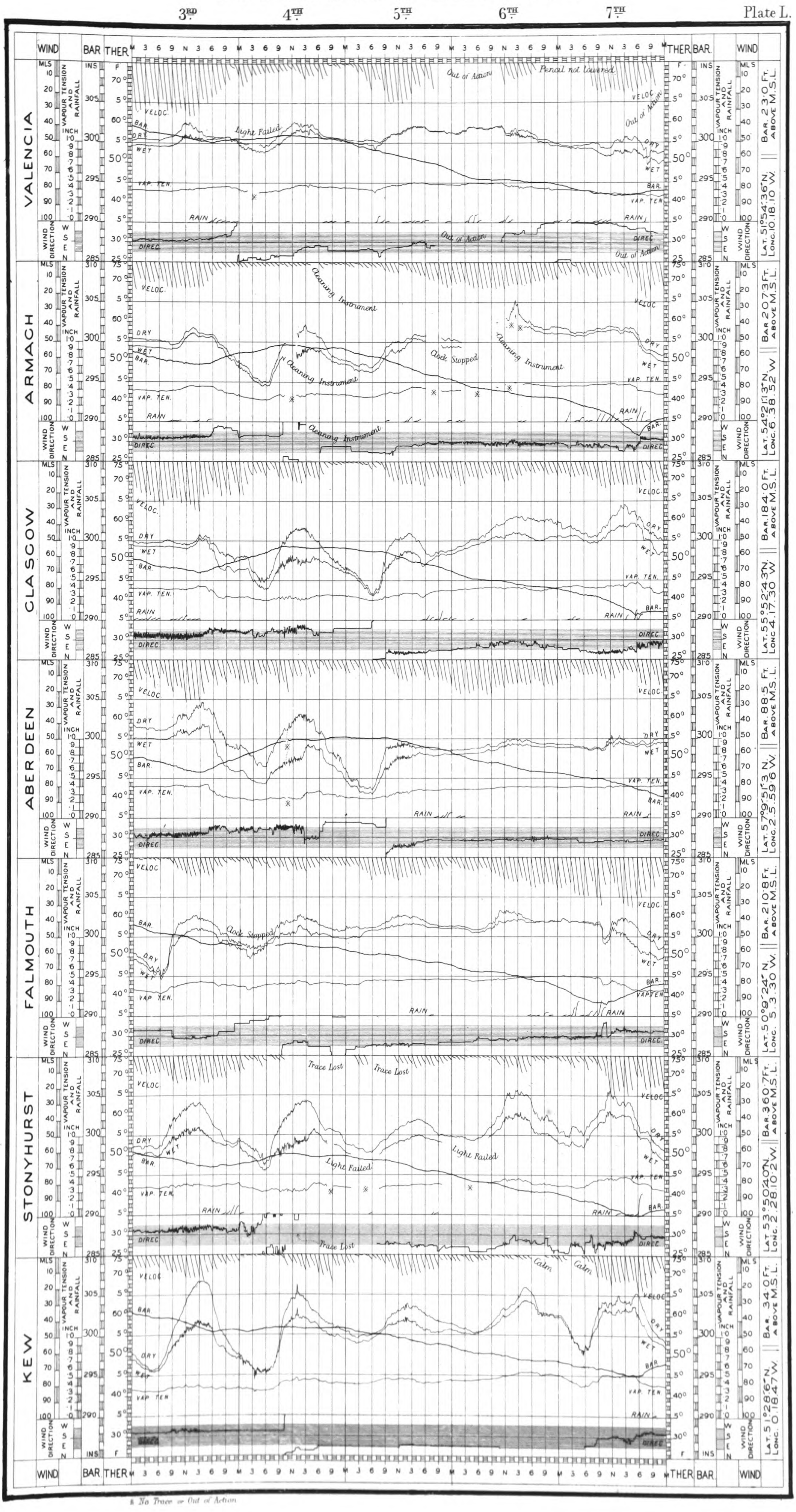
Plate XLIX.



* No Trace or Out of Action

SEPTEMBER —— 1879.

Plate L.



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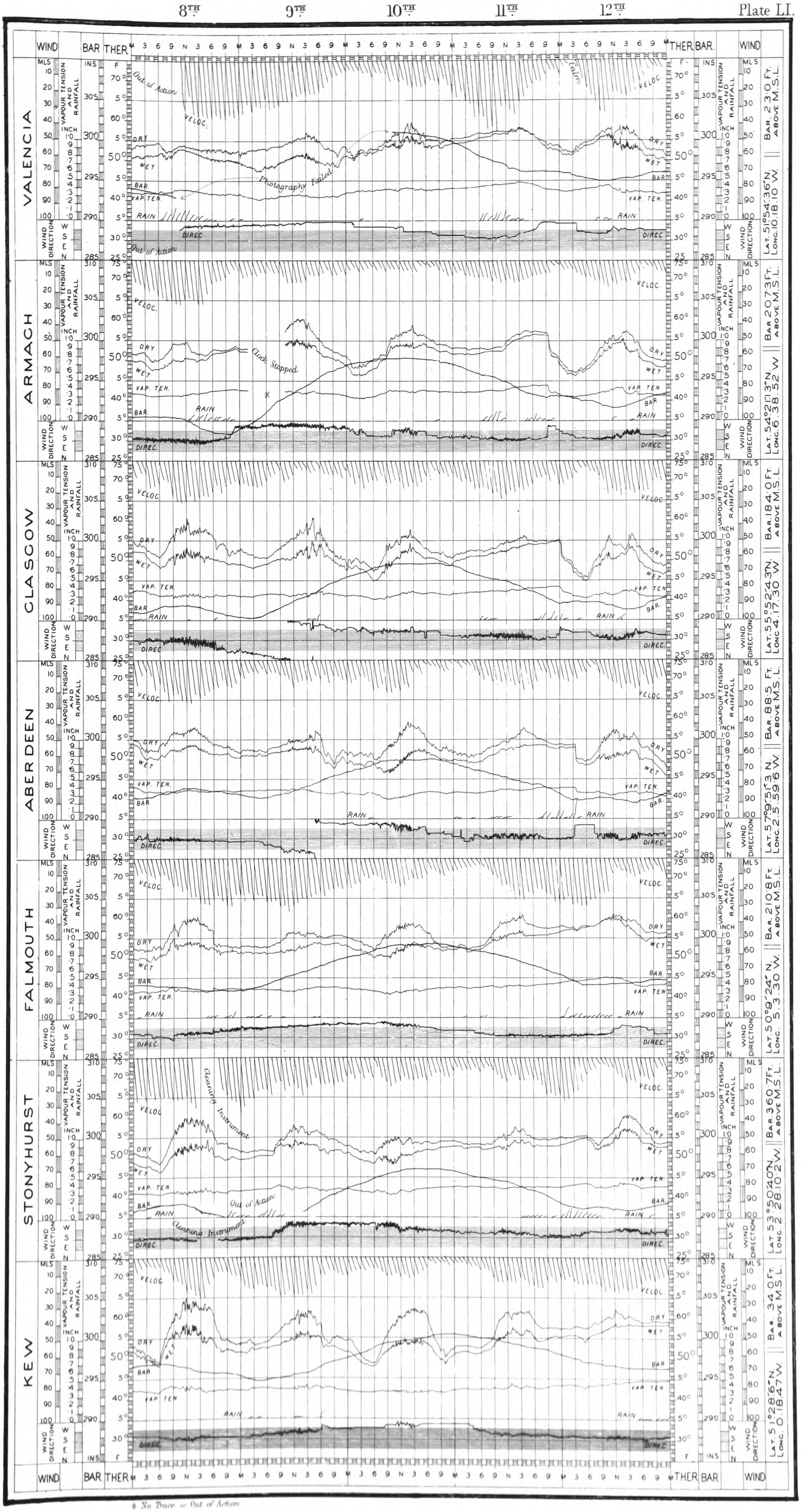
SEPTEMBER ——— 1879.

Plate LI.



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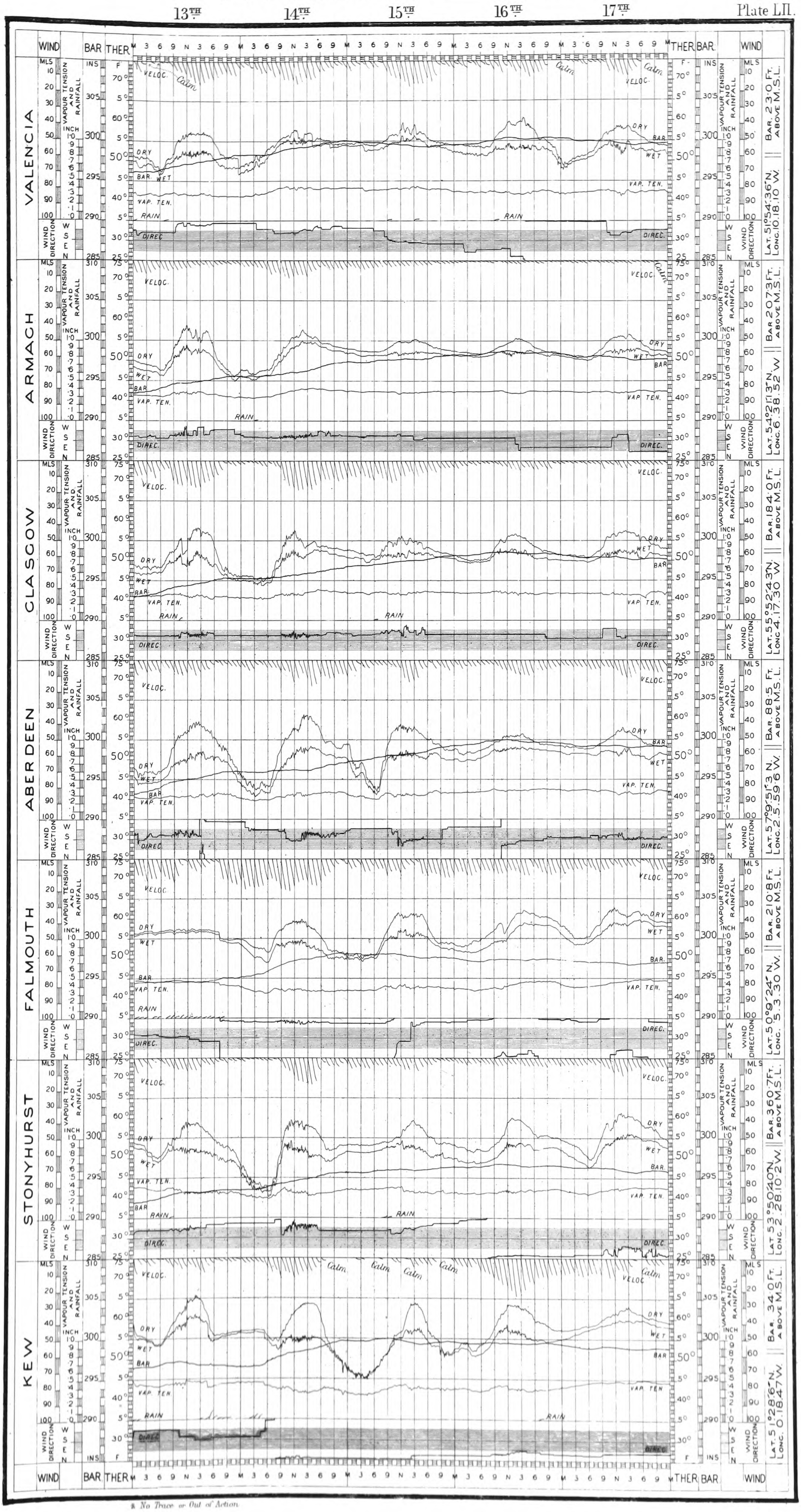
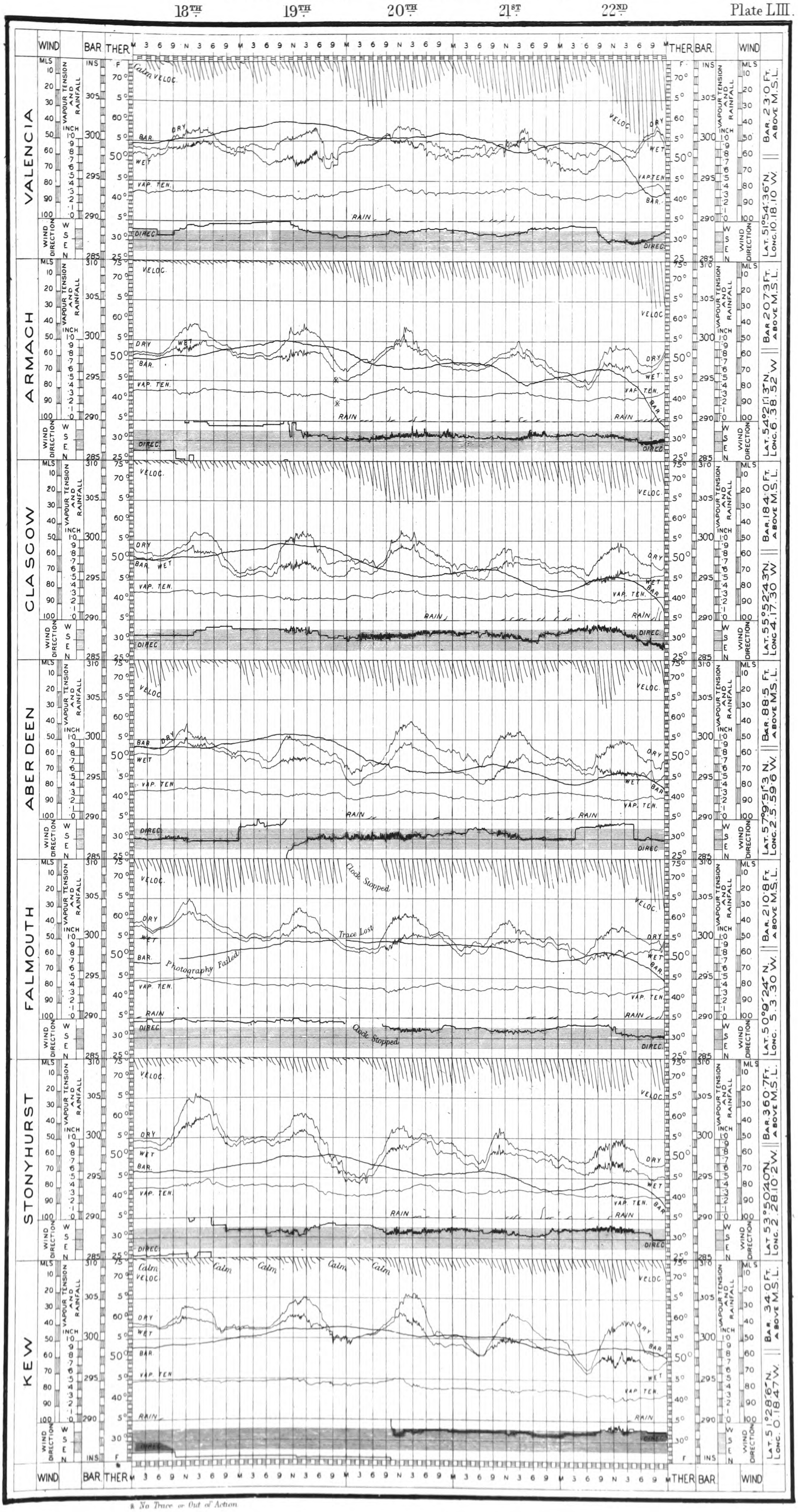
SEPTEMBER ——— 1879.

Plate LII.



▨ No Trace or Out of Action

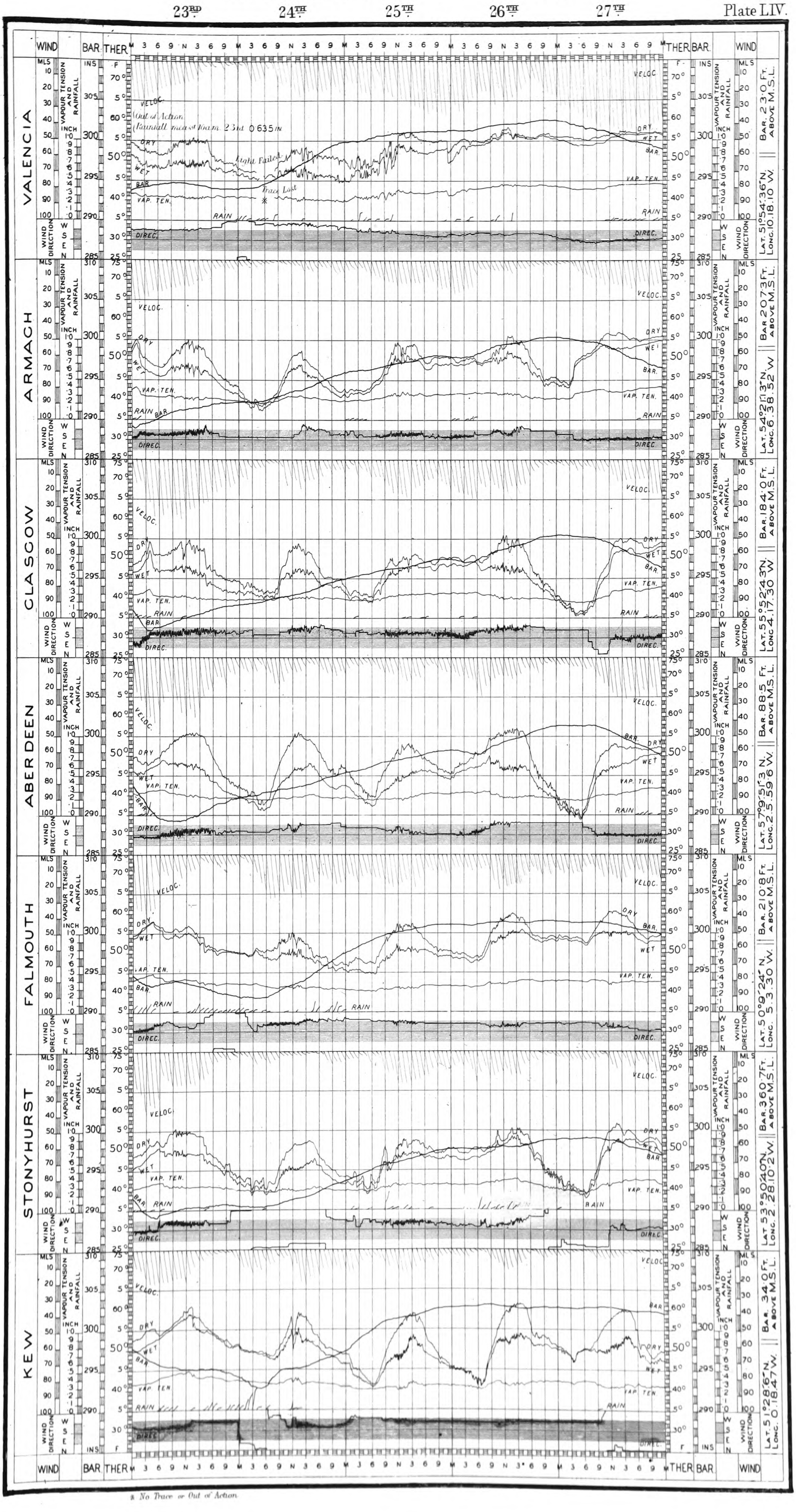
SEPTEMBER ——— 1879.



* No Trace or Out of Action.

SEPTEMBER —— 1879.

Plate LIV.



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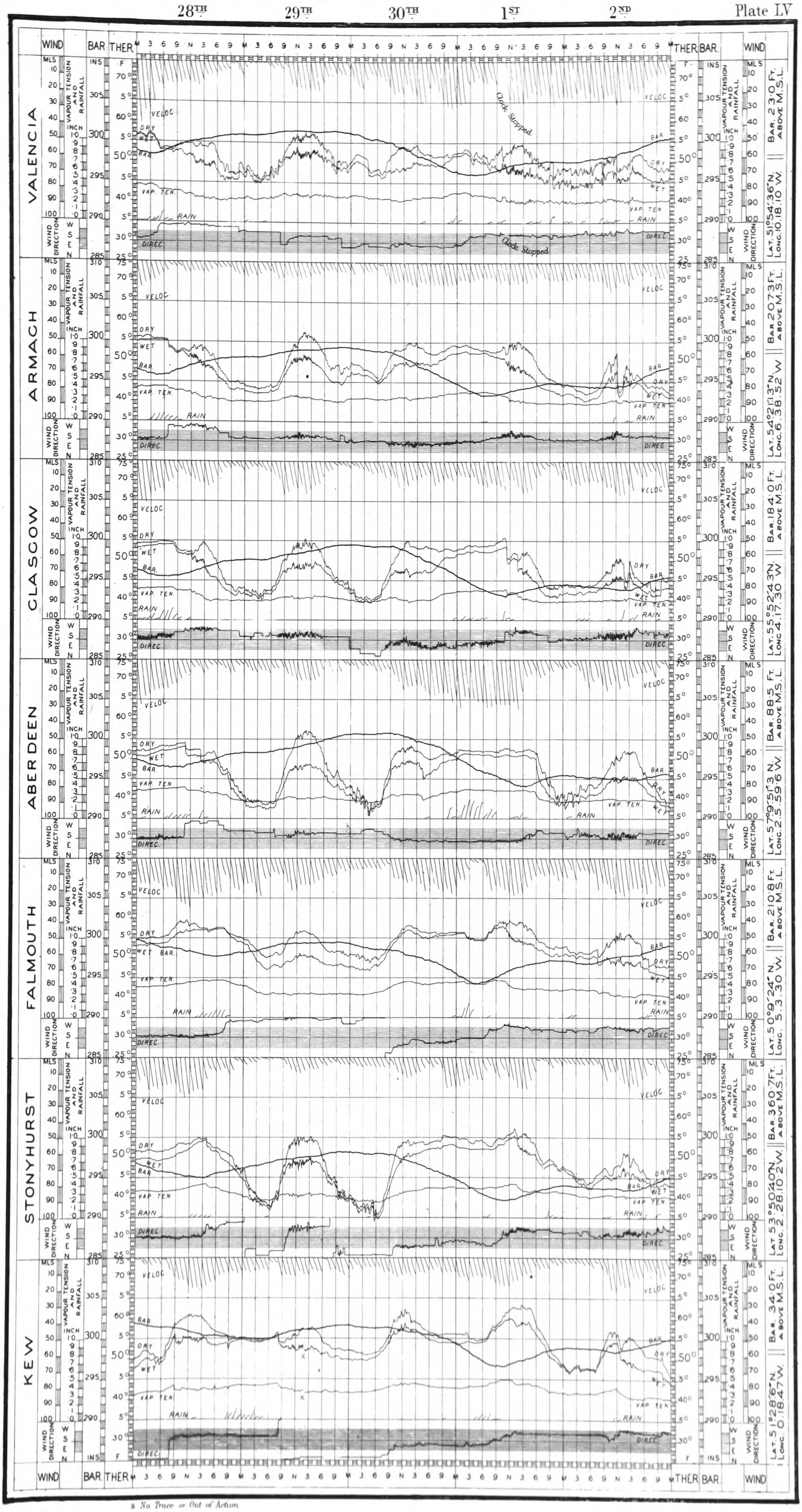
SEPTEMBER — OCTOBER — 1879.

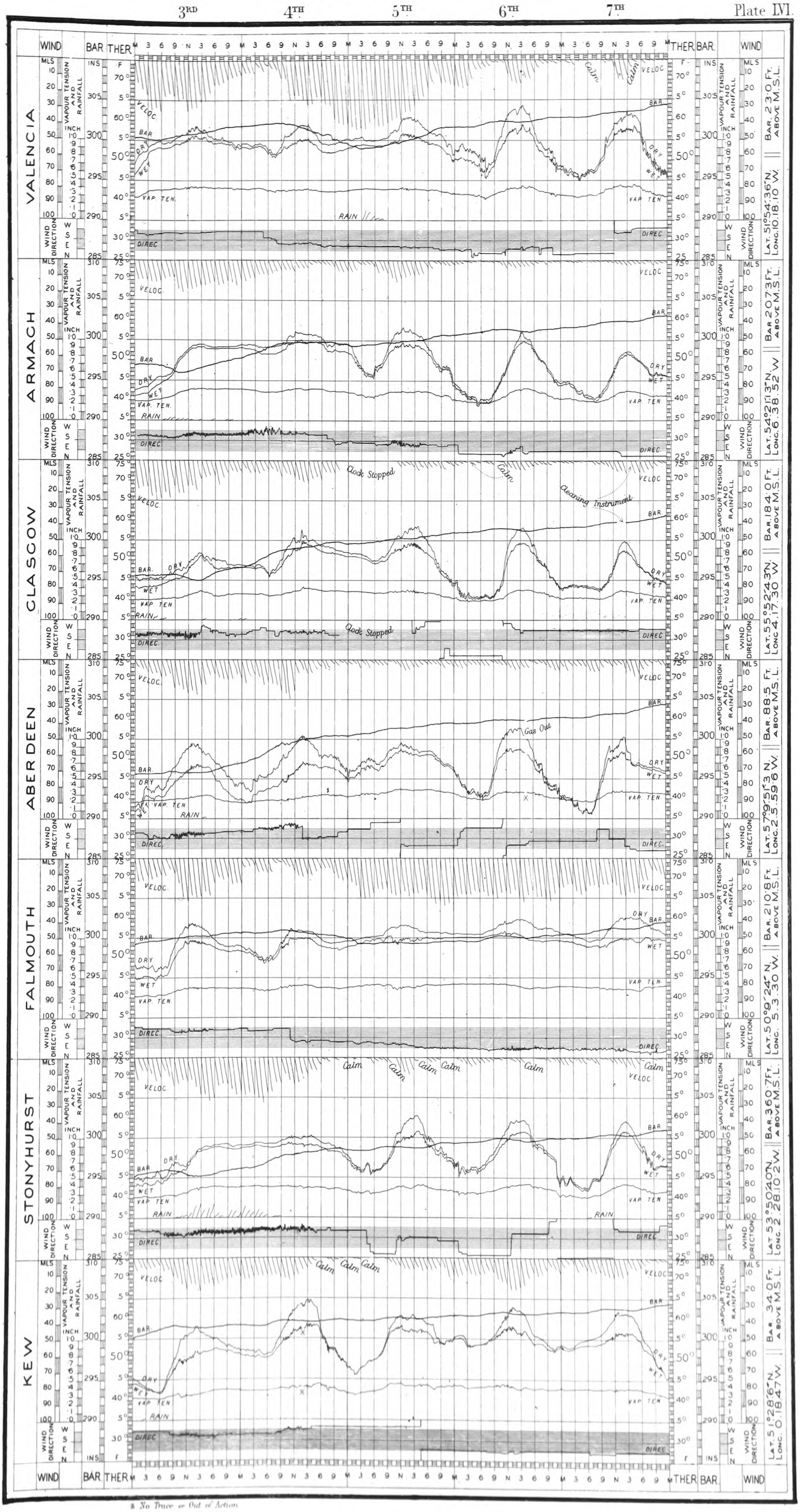
Plate LV



* No Trace or Out of Action

OCTOBER — 1879.

Plate LVI.



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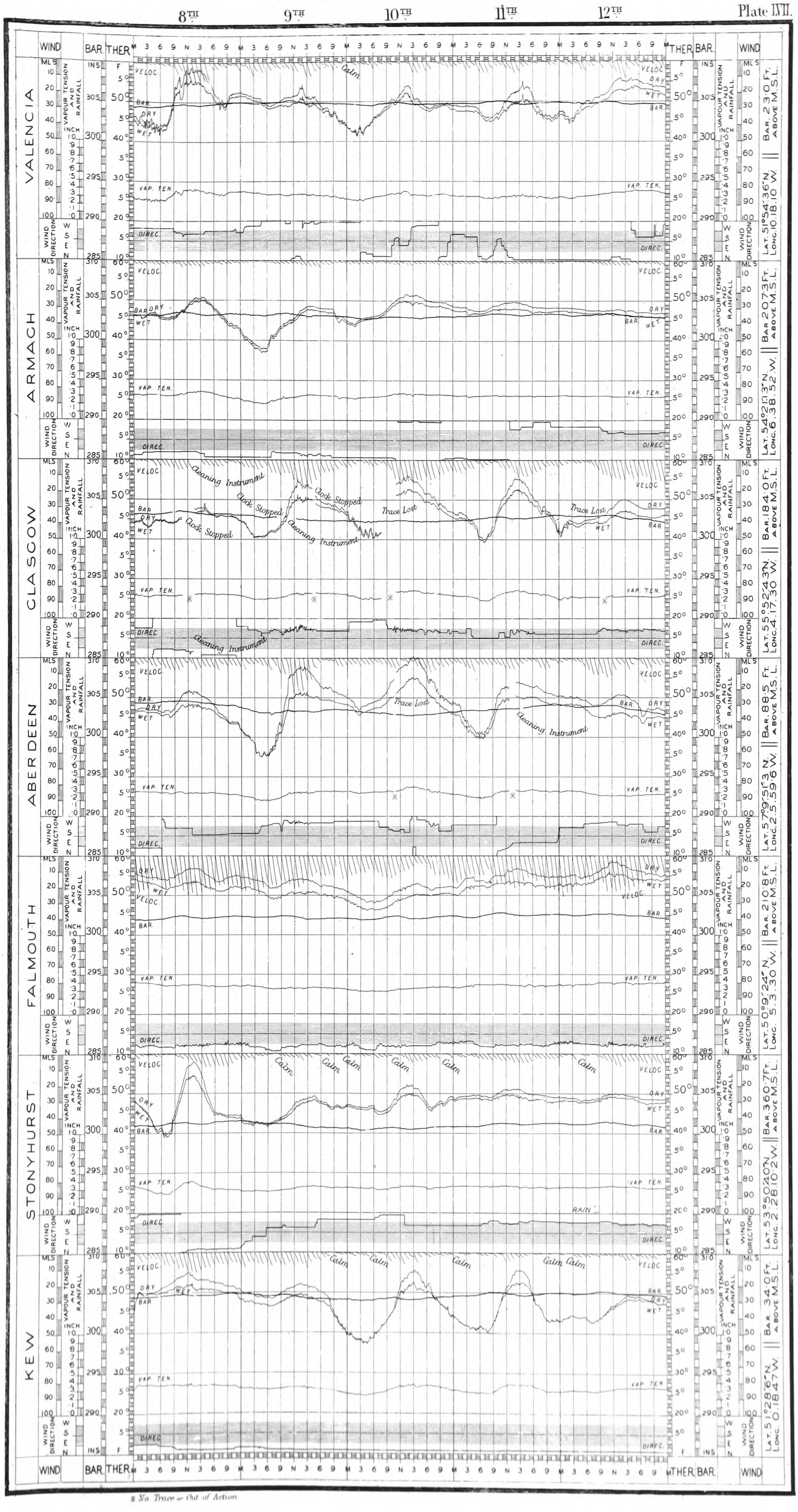
OCTOBER, — 1879.

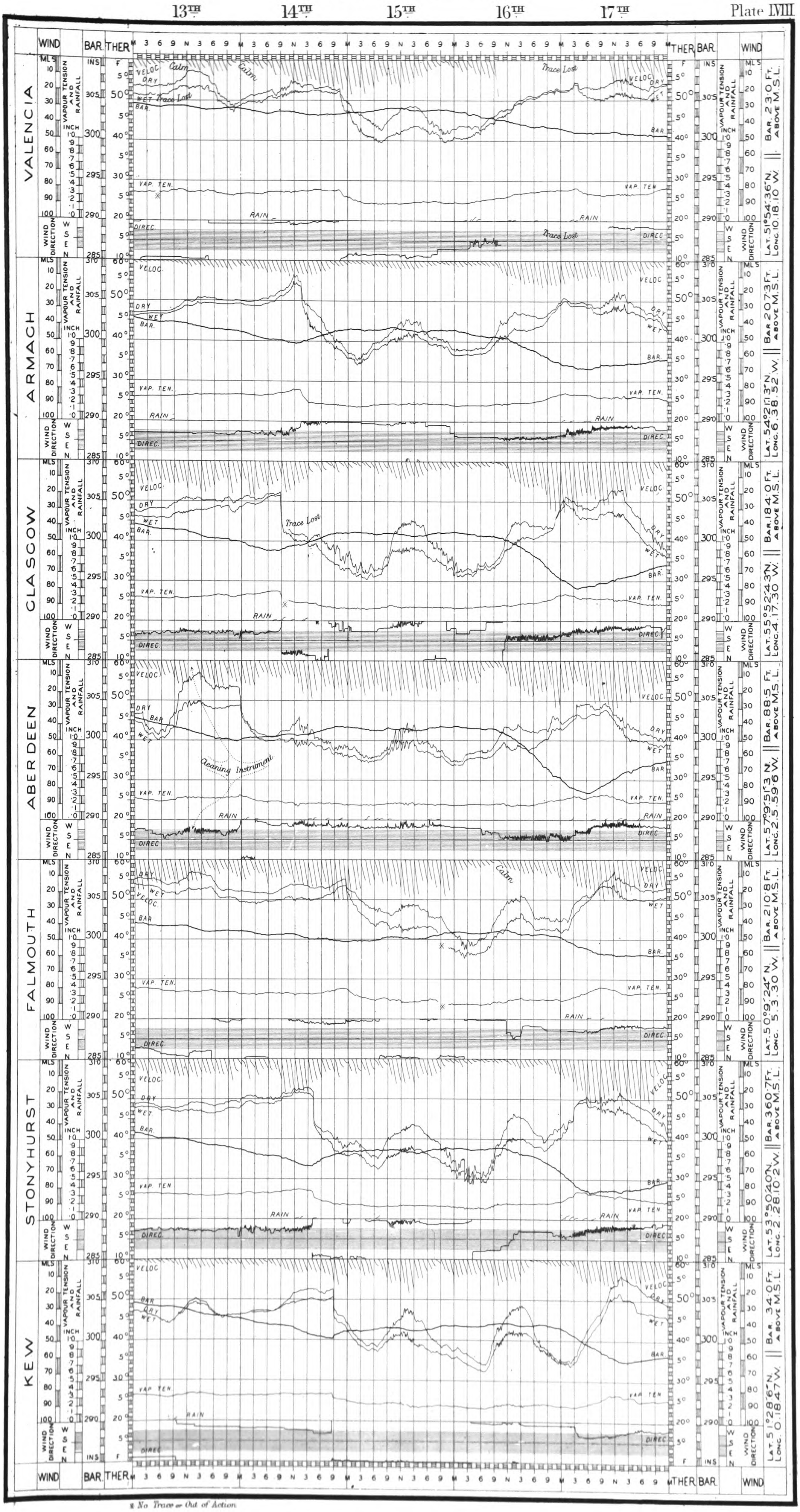
Plate LVII.



x No Trace or Out of Action

OCTOBER, ___ 1879

Plate LVIII



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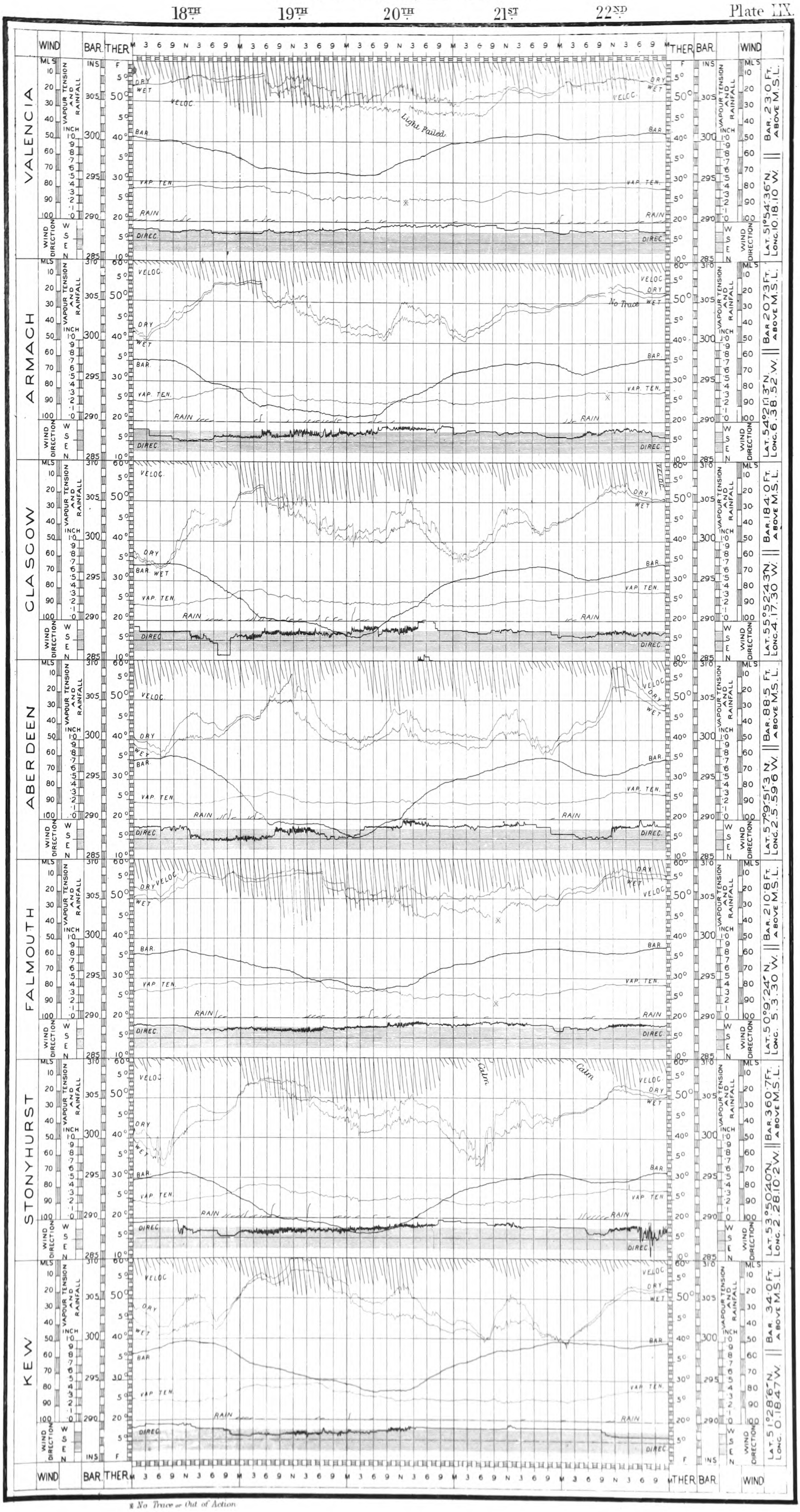
OCTOBER, — 1879.



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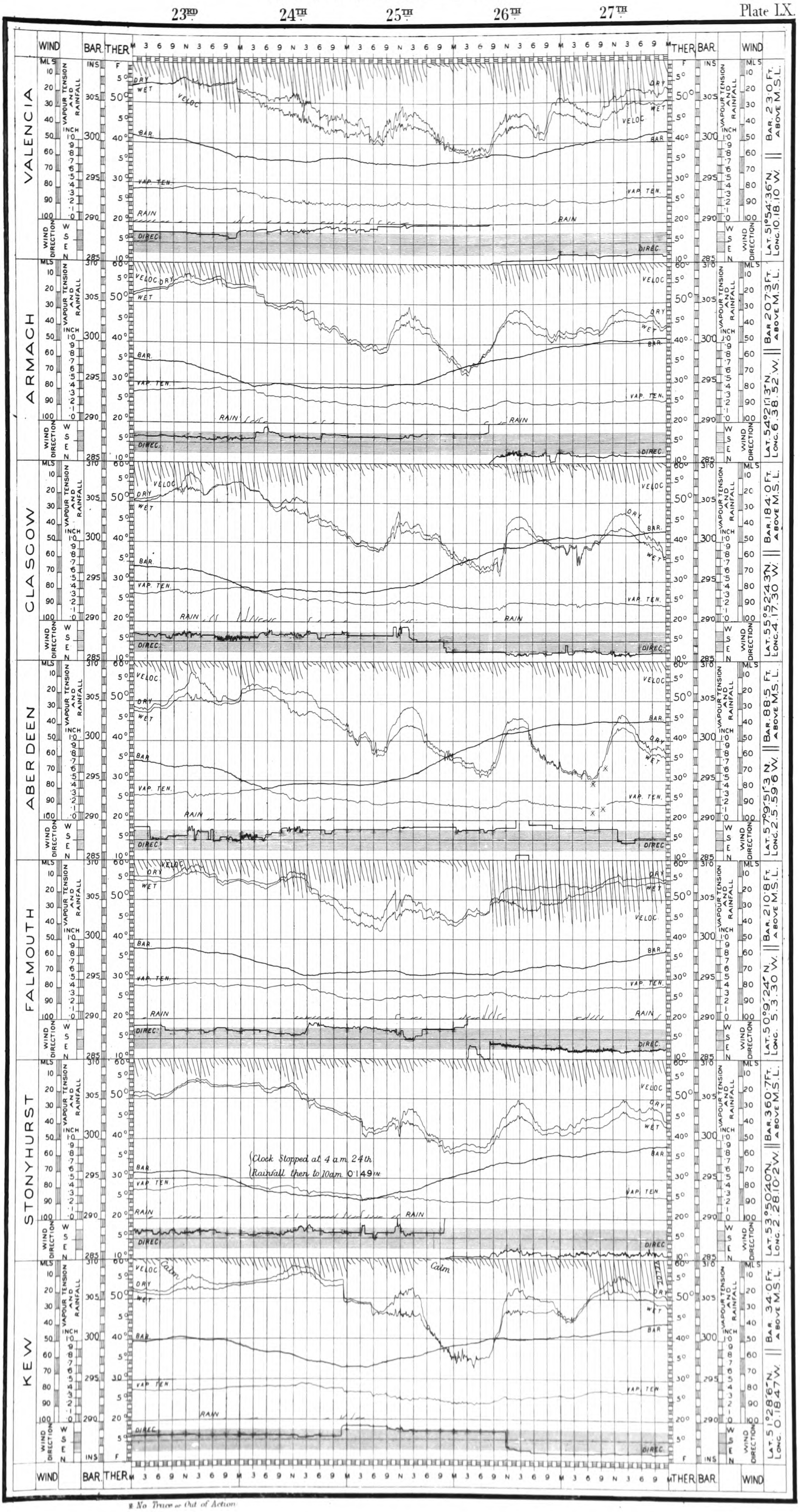
OCTOBER —— 1879.



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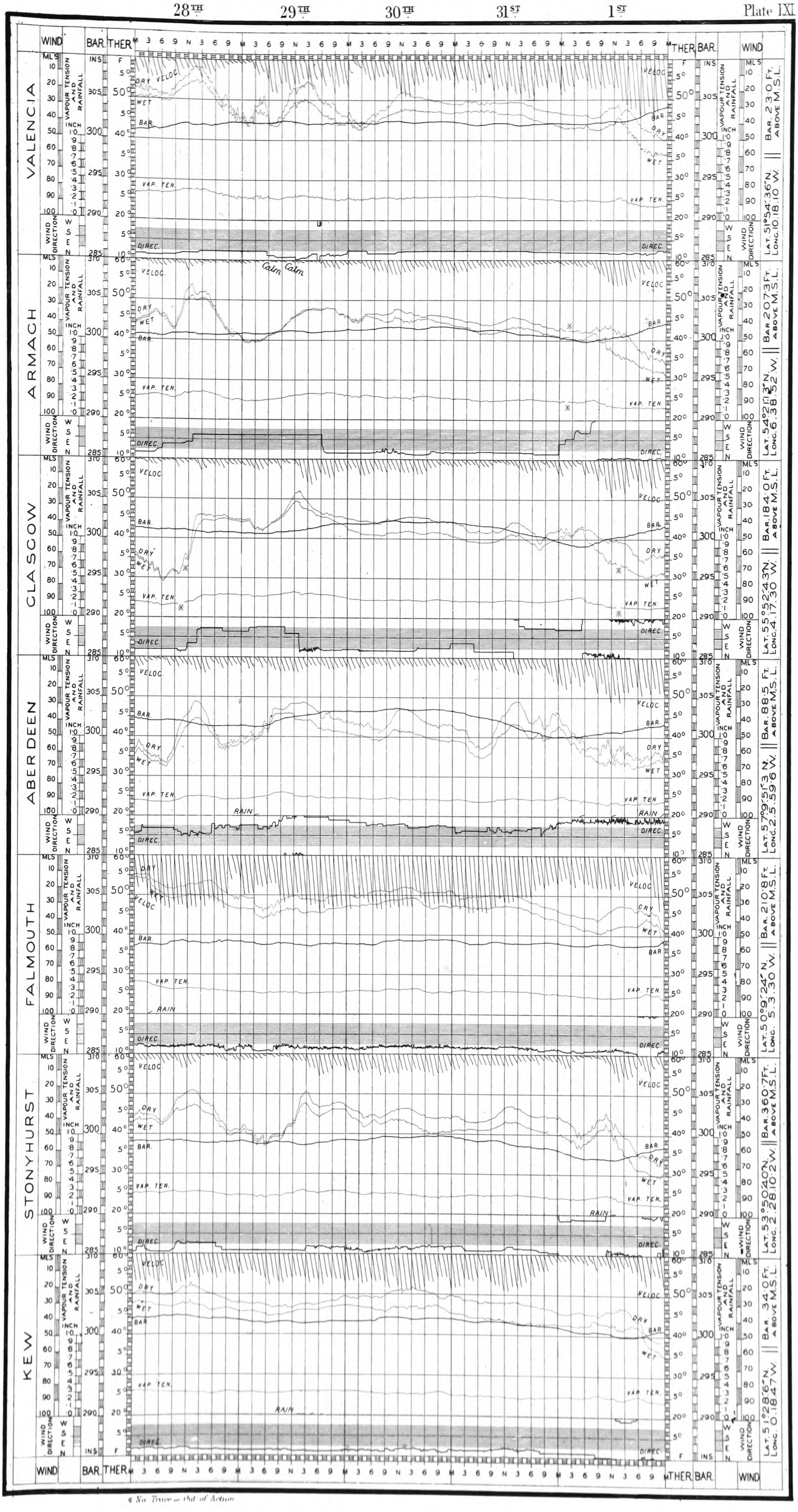
OCTOBER & NOVEMBER, — 1879.

Plate IXI

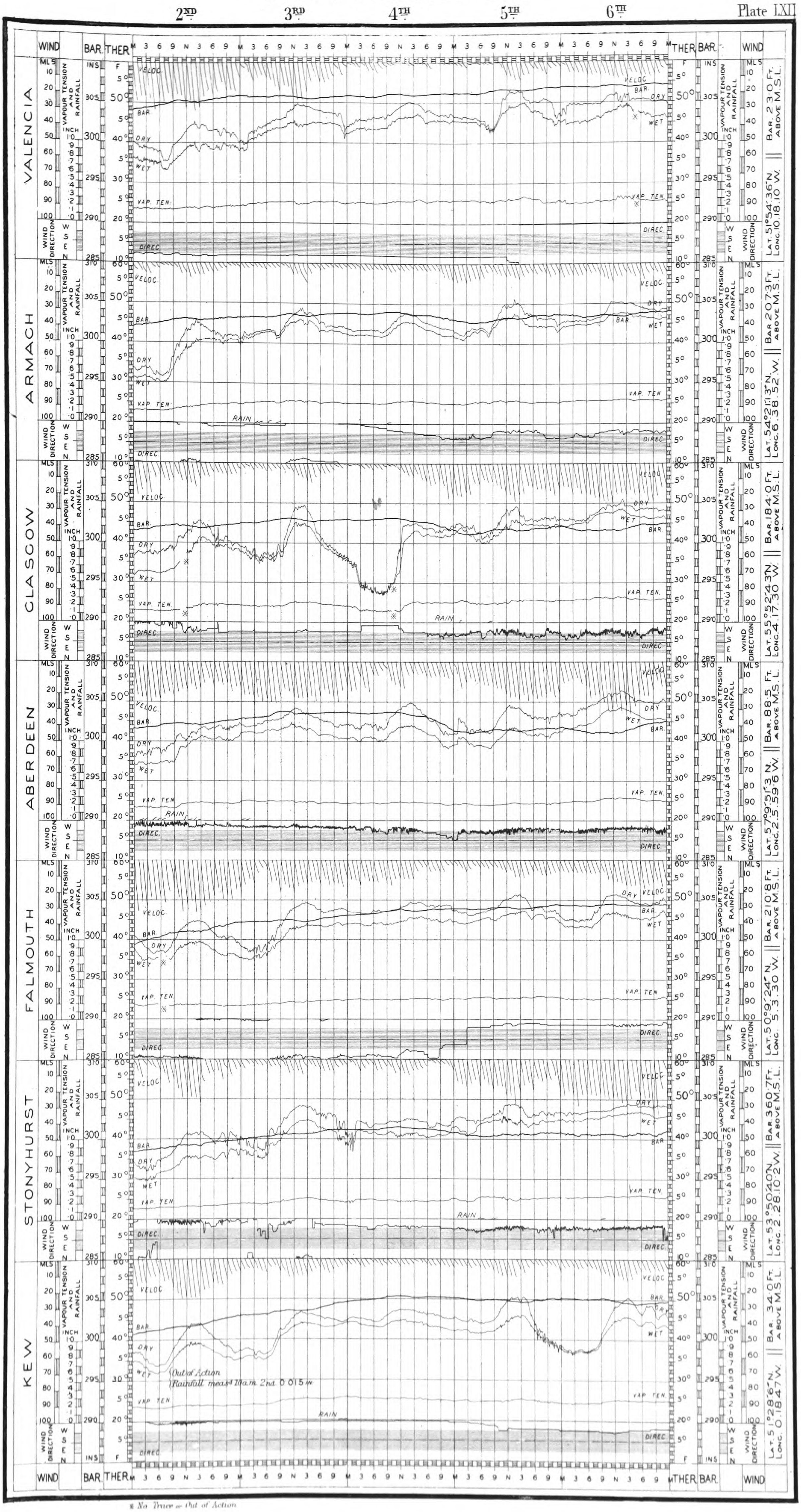


✱ No Trace or Out of Action

NOVEMBER, — 1879.

2ND 3RD 4TH 5TH 6TH

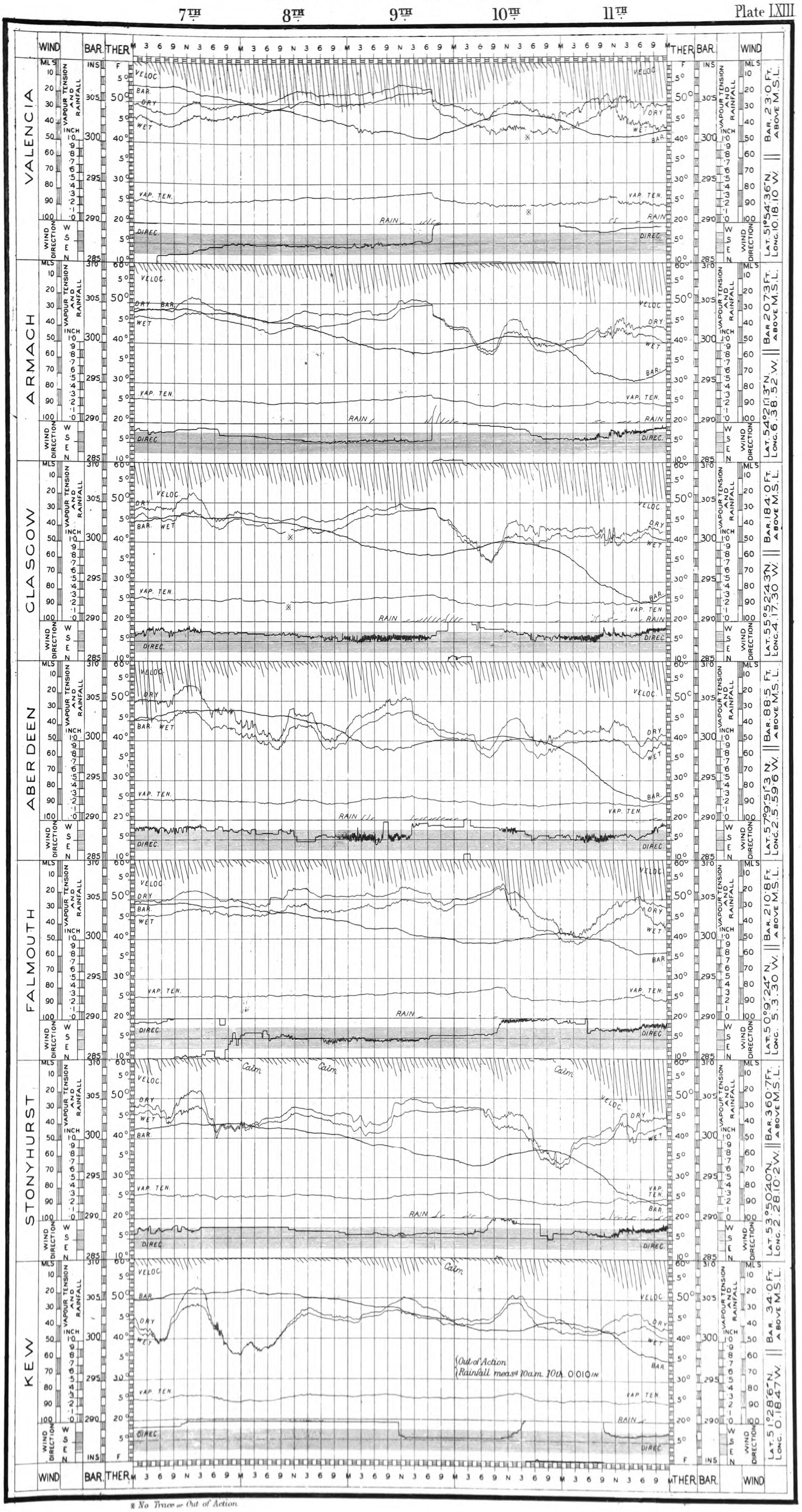
Plate LXII



× No Trace or Out of Action

NOVEMBER, — 1879.

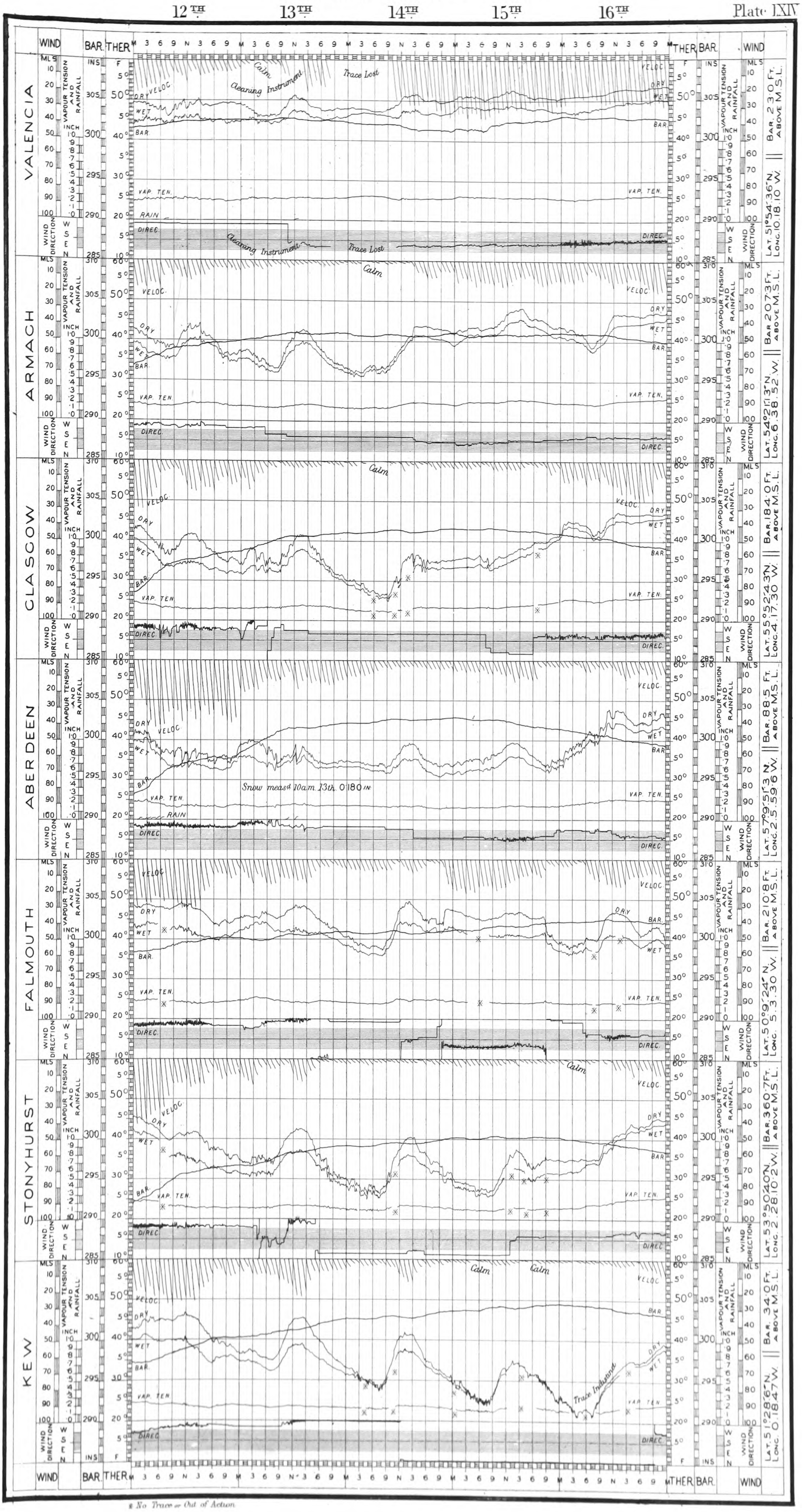
Plate LXIII



* No Trace or Out of Action

NOVEMBER, — 1879.

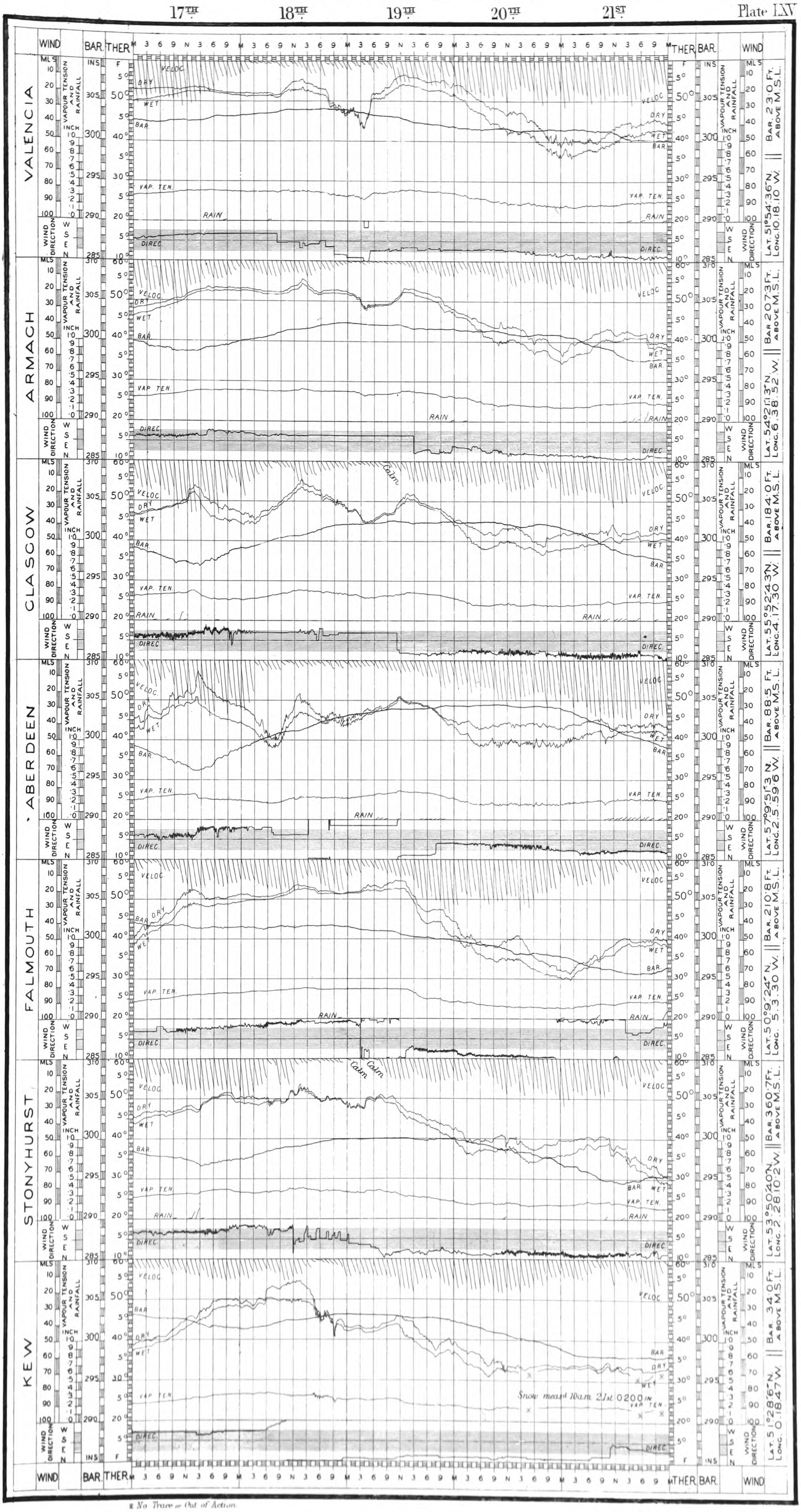
Plate LXIV



* No Trace or Out of Action

NOVEMBER, — 1879.

Plate LXV



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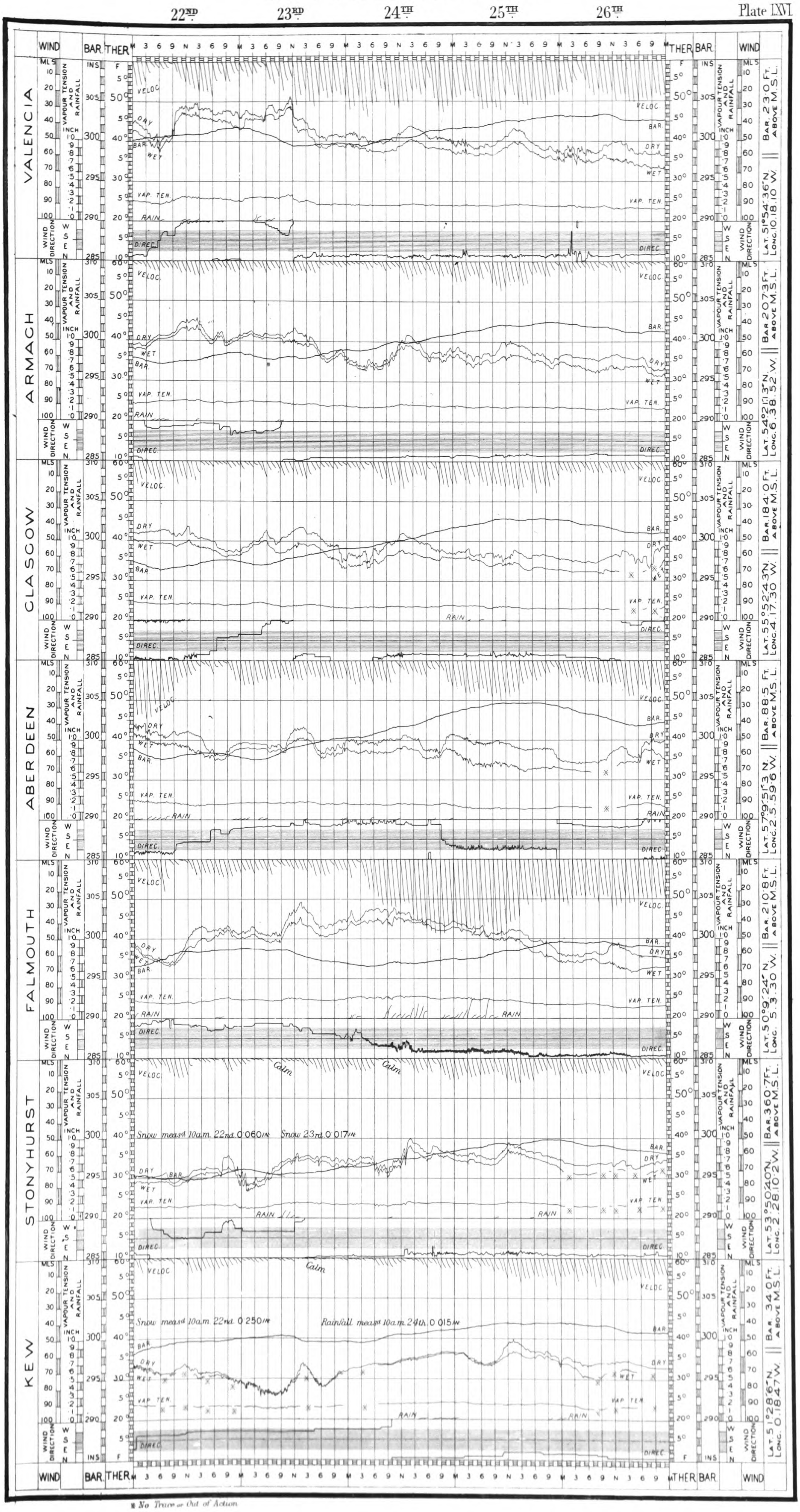
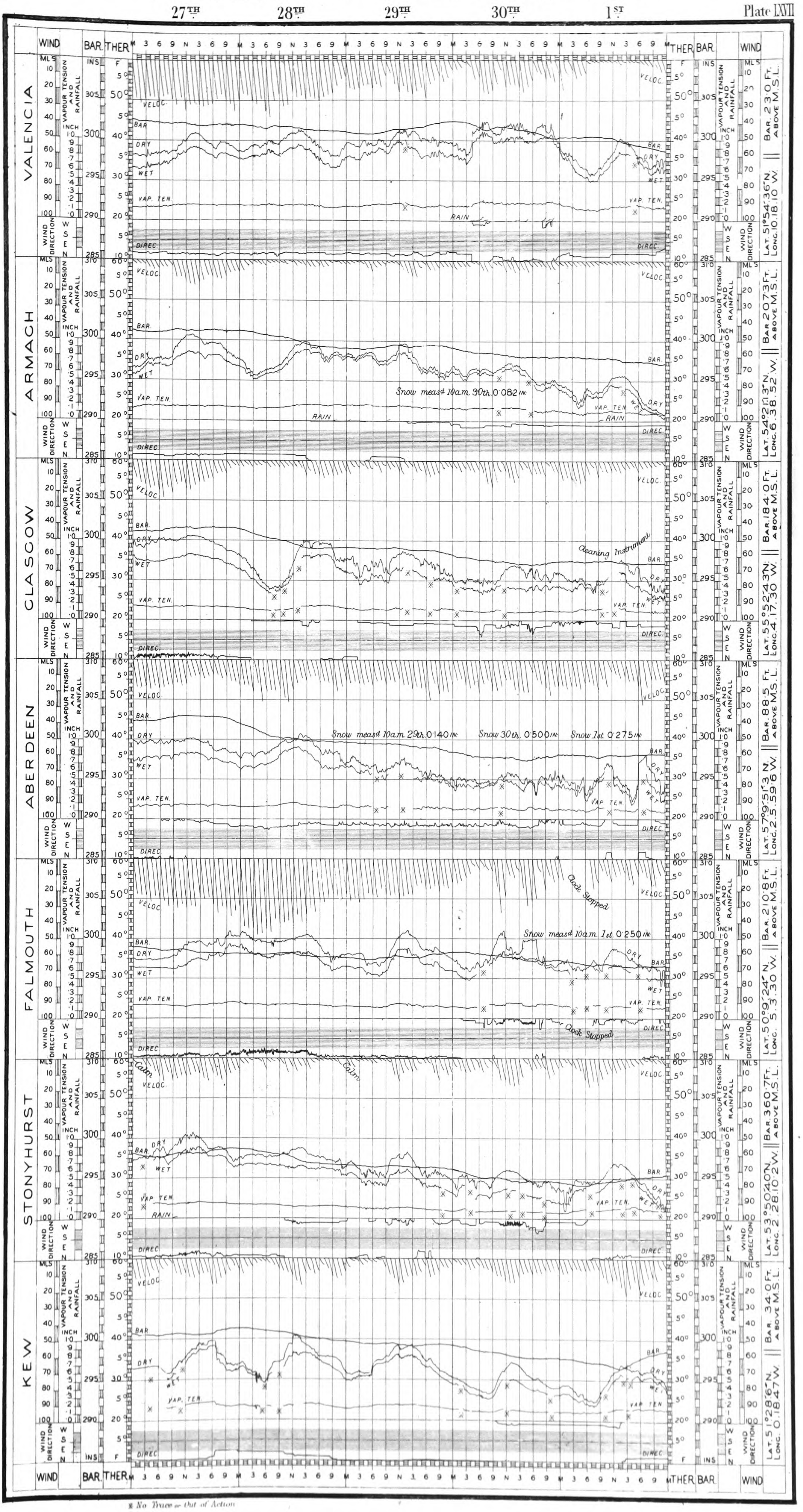
NOVEMBER, — 1879.



× No Trace or Out of Action

NOVEMBER & DECEMBER, 1879.



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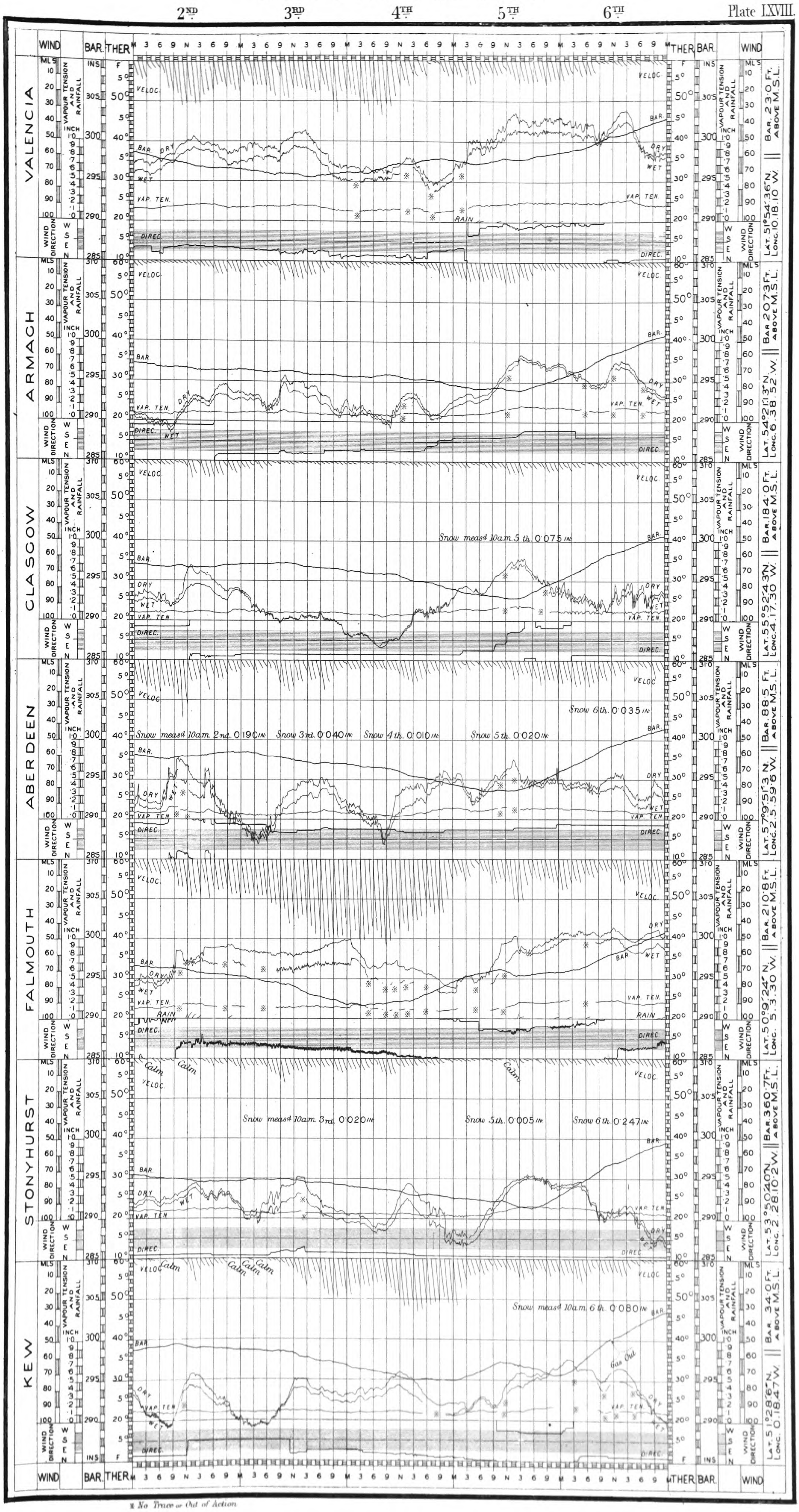
DECEMBER — 1879.



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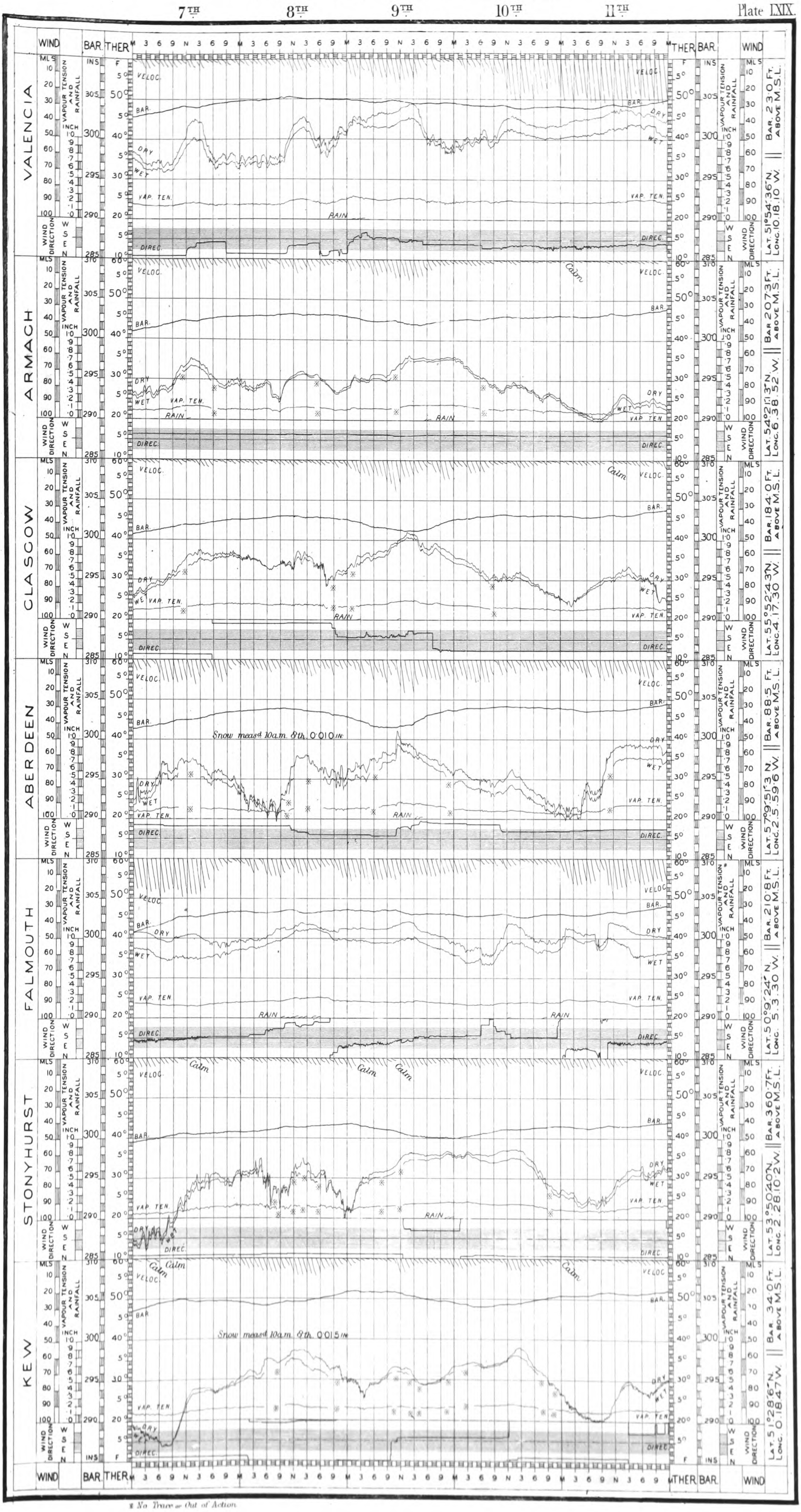
DECEMBER — 1879.



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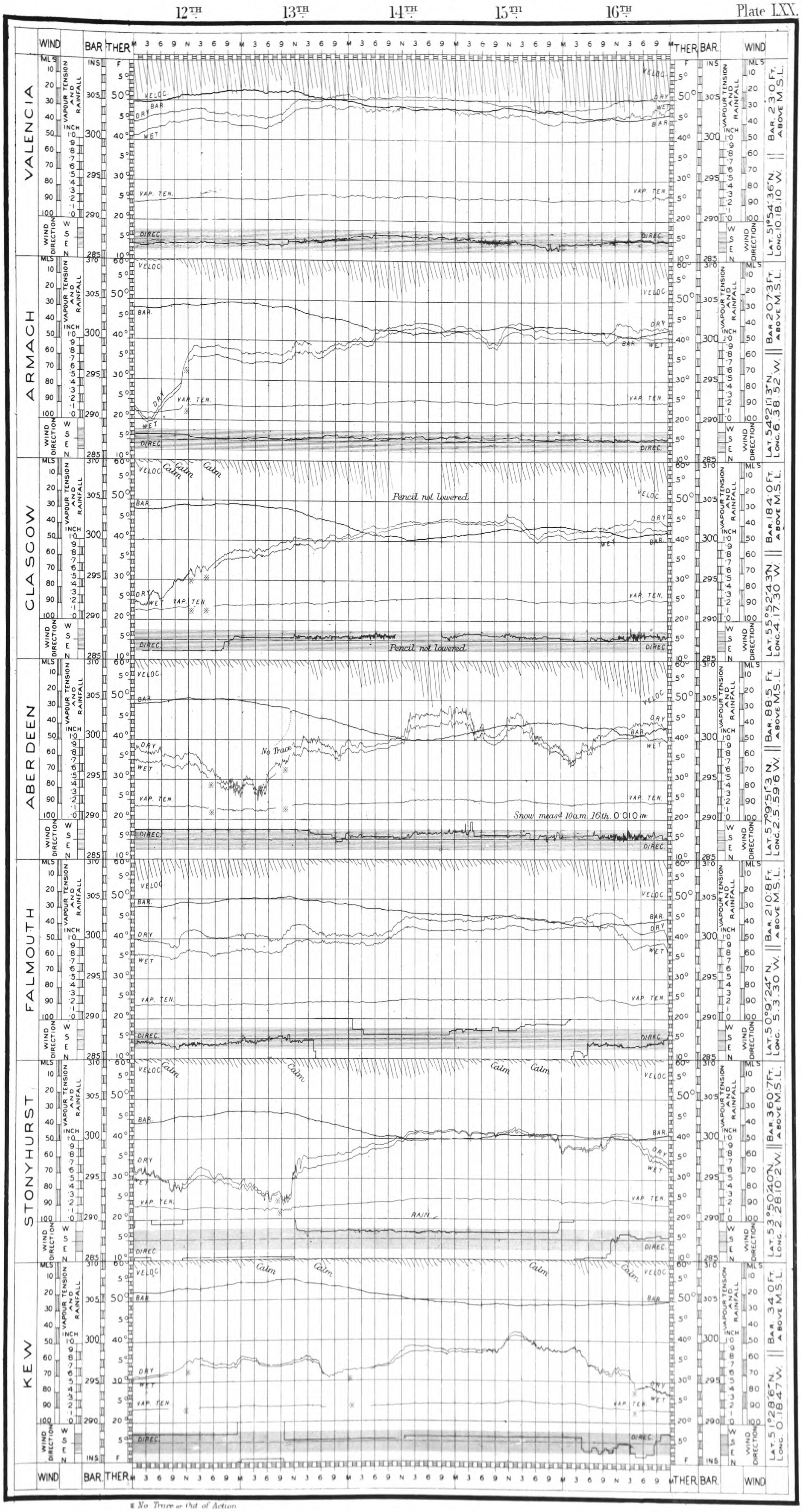
DECEMBER — 1879.

Plate LXX.



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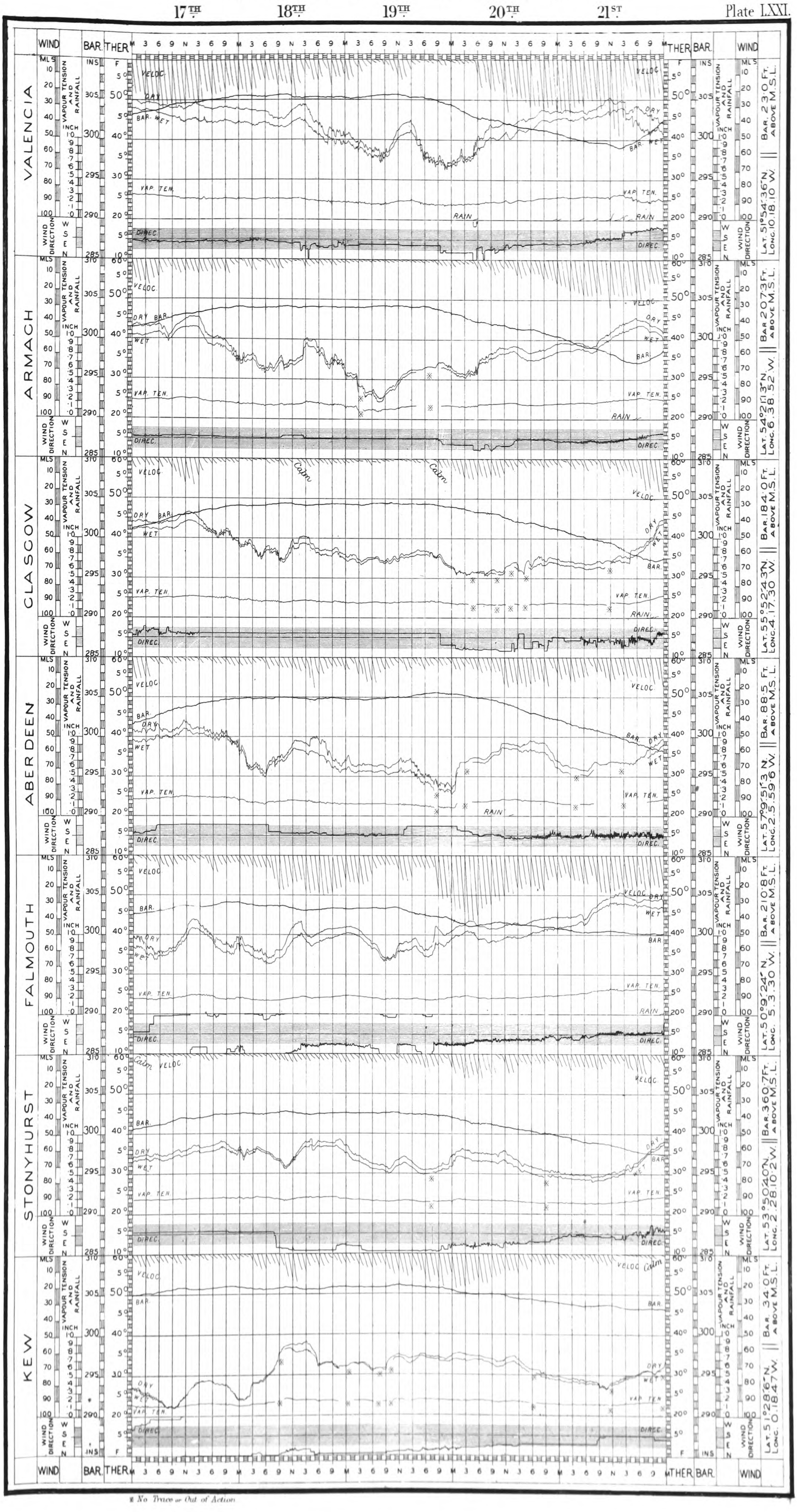
DECEMBER — 1879.

Plate LXXI.



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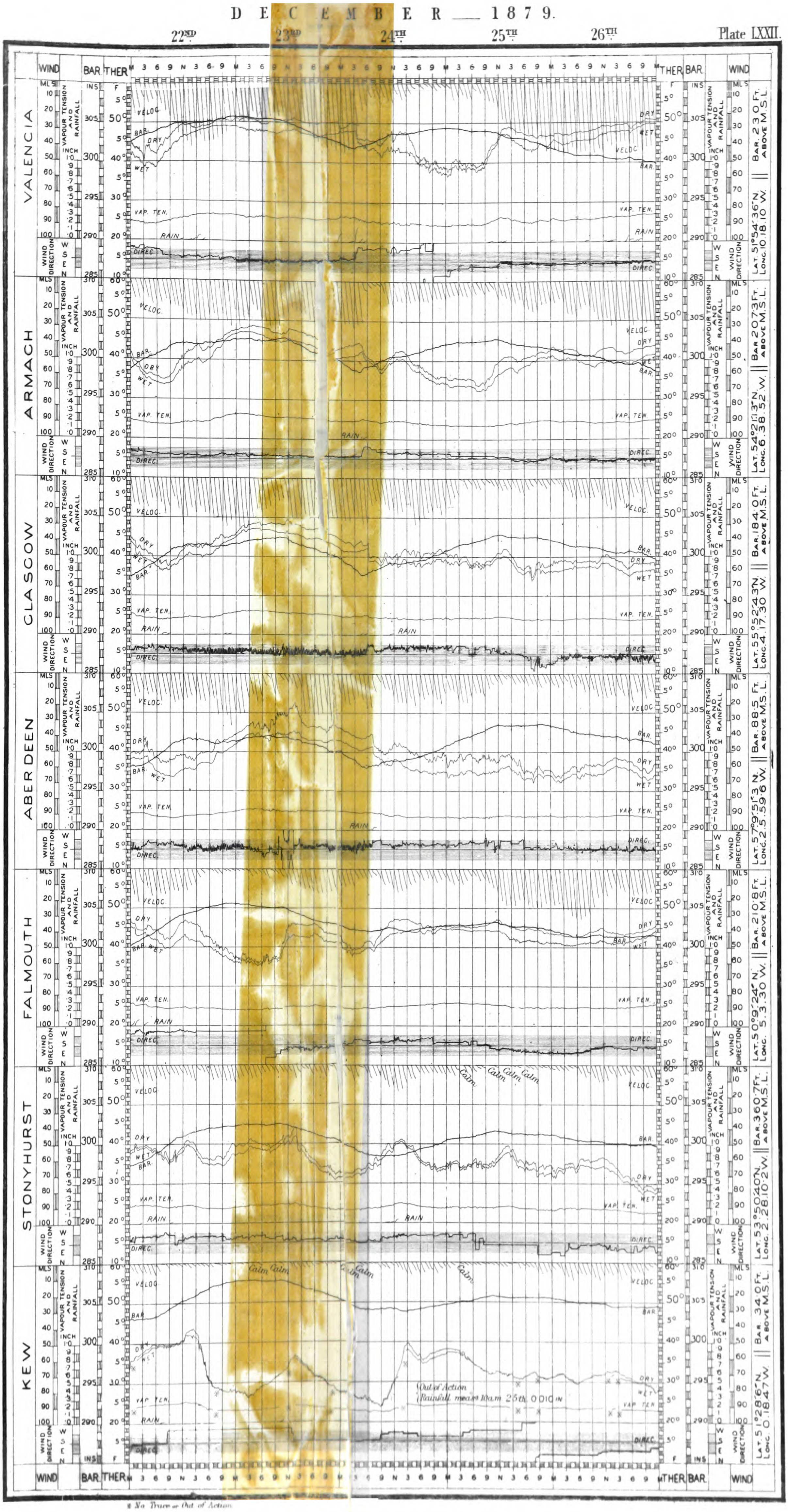
DECEMBER — 1879.

Plate LXXII.



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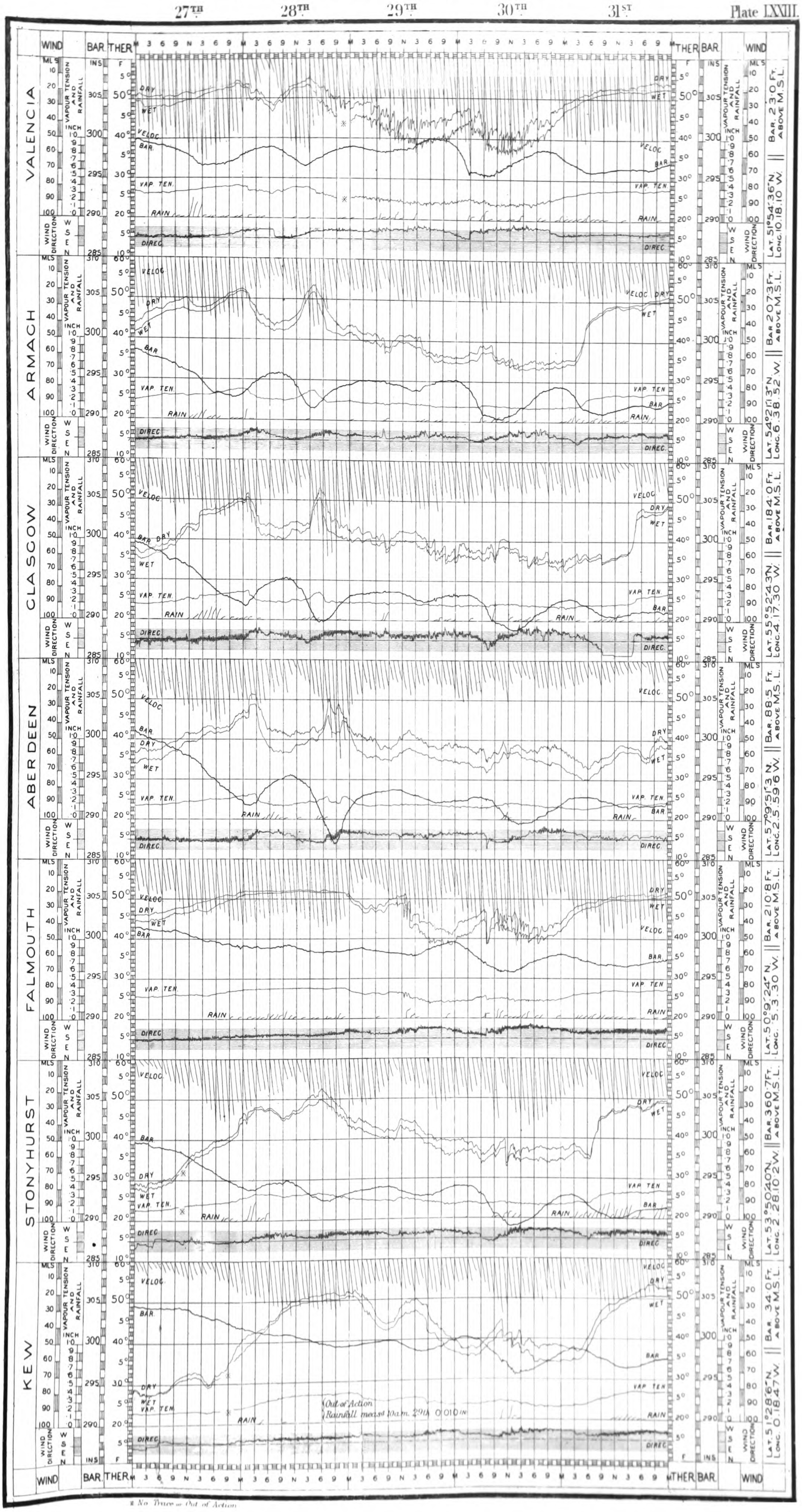
DECEMBER — 1879.

Plate LXXIII.



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